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JOURNAL OF AGRICULTURE

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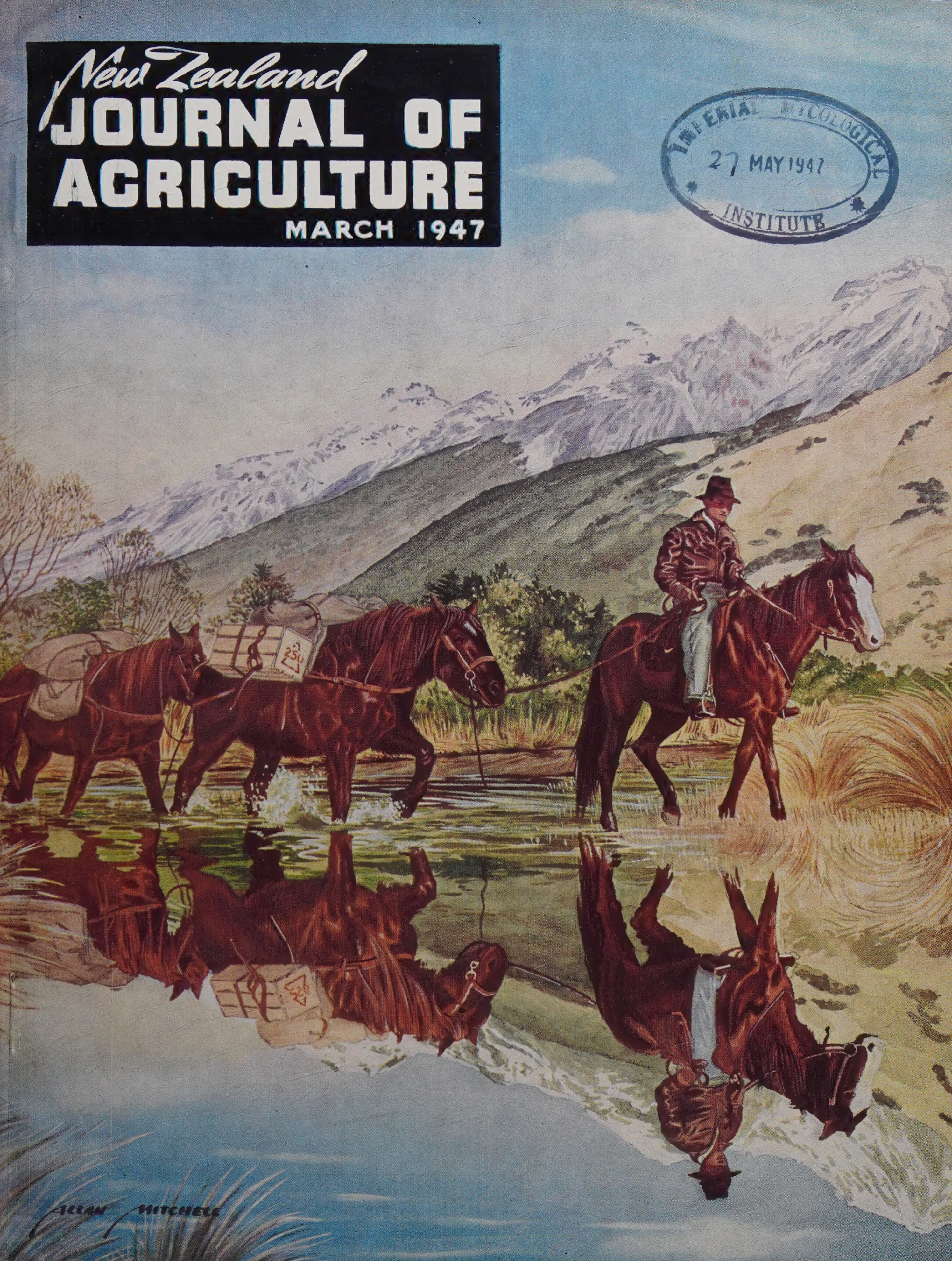
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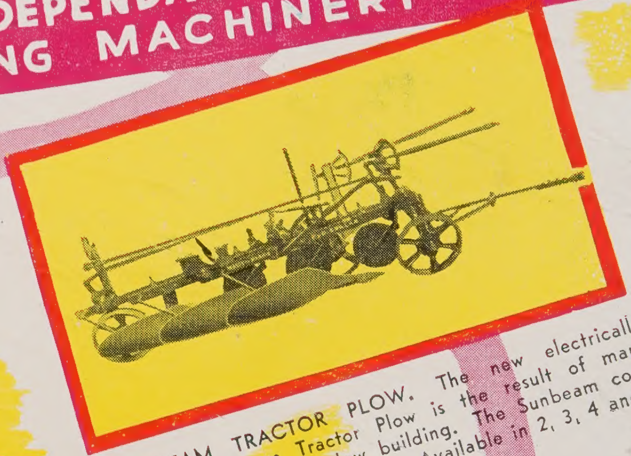

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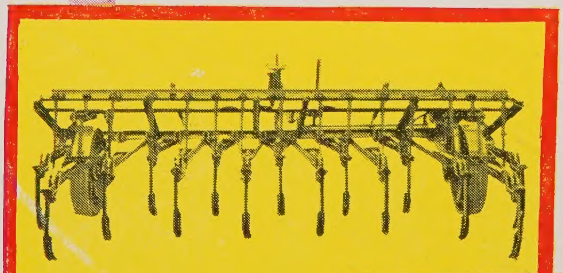

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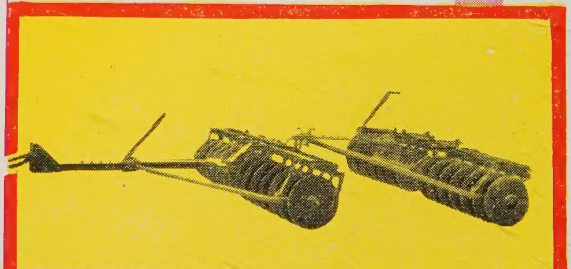

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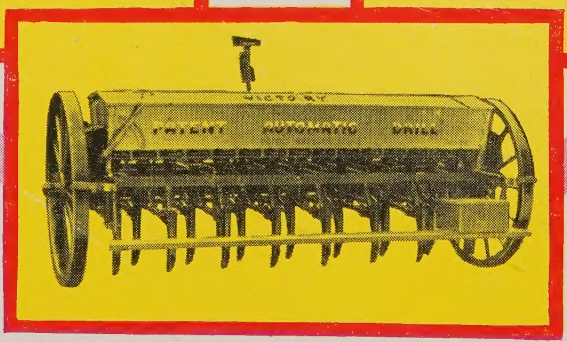

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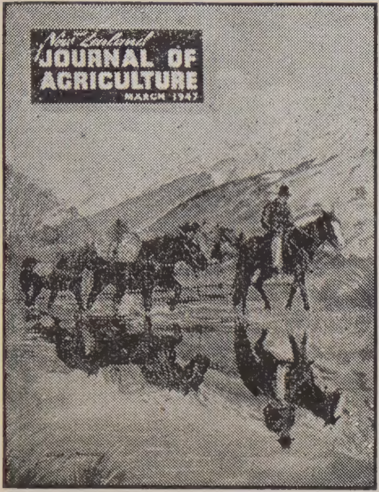

Against the background of the Humboldt Range a packhorse team reflected in a lagoon in Otago's Dart Valley has been painted for this month's cover by Allan Mitchell, from a photograph by courtesy of the Auckland "Weekly News."

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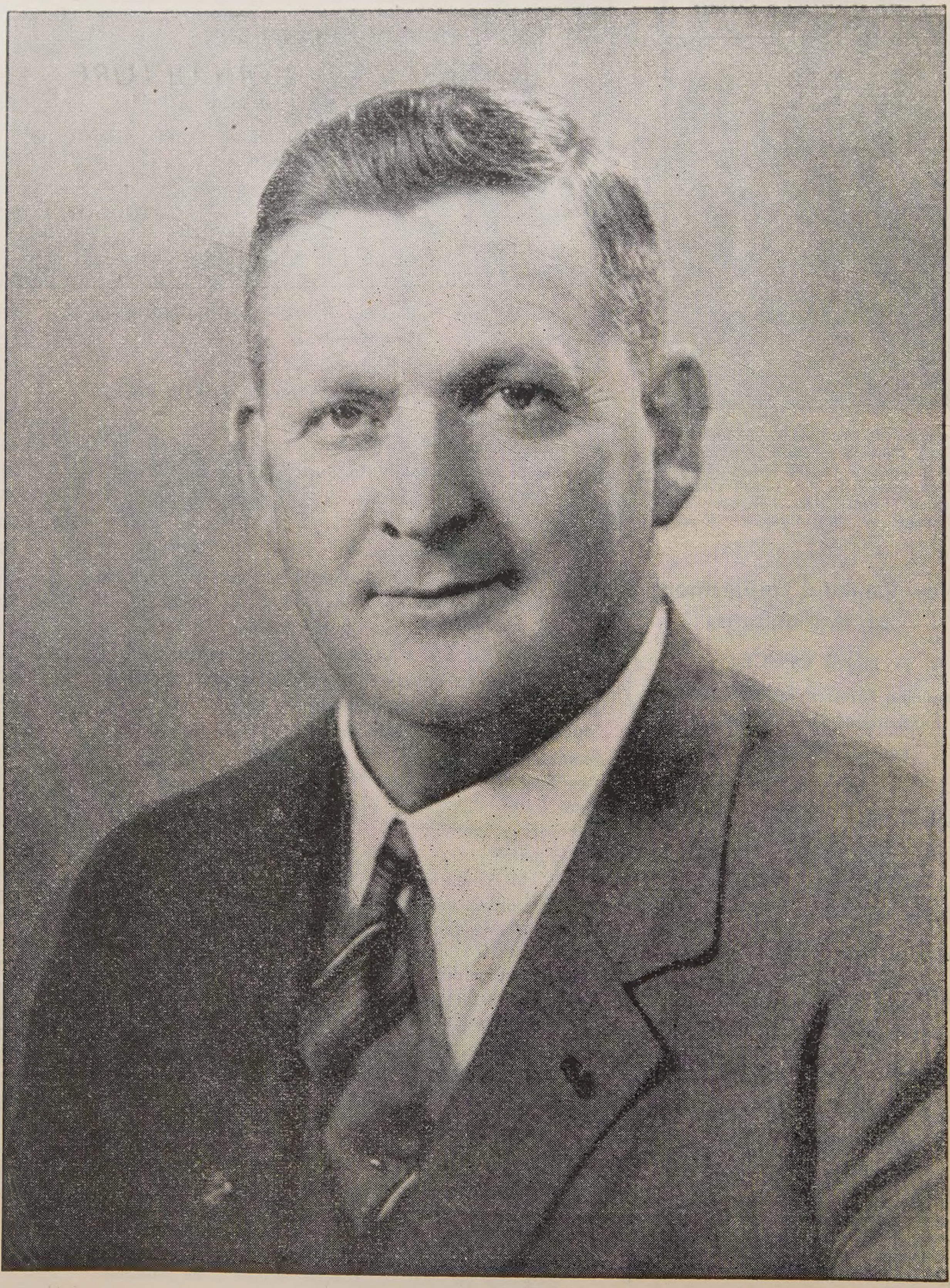

The Hon. E. L. Cullen, Minister of Agriculture.

[*Spencer Digby photo.*

A REVIEW OF FOOD PRODUCTION

By THE HON. E. L. CULLEN, *Minister of Agriculture.*

THE year 1947 may be a momentous one, for the welfare of so many peoples may be affected by decisions reached at international discussions on trade, food, and agriculture. The Food and Agriculture Organisation is completing draft plans for the establishment of a World Food Board, the aim of which is to enable food production and consumption to be increased without the constant threat to producers that extra efforts in production or bountiful seasons will result in surpluses which cannot be consumed because the people who require the food are unable to pay for it. In short, it aims at maximum world food production and increased consumption, with international control of buffer stocks to conserve reserve supplies in event of shortages, but not to allow such stocks to be used as a threat to production. Under such control surpluses would be distributed to benefit peoples whose trade was in need of stimulation and would not be burnt or destroyed as was often done in the past.

Whatever may be the outcome of these international discussions, and I sincerely hope that some workable plan will be evolved to stimulate the production and consumption of food, I feel that 1947 is also likely to be important in the history of New Zealand farming. We have our immediate task of making a maximum production effort in 1947-48 to help relieve world food shortages and we must also consider the longer-term development of farming to meet either expanding markets or increased competition on restricted markets. We depend chiefly on the products of pastoral farming and our aim should be to increase the efficiency of our grass-farming methods, for only efficiency will enable us to increase production and withstand competition.

Topdressing Topdressing of grassland has been the greatest single factor in increasing farming efficiency during the past 30 or 40 years and I am pleased to advise farmers that New Zealand's allocation of rock phosphate for the manufacture of superphosphate has been raised this year from 300,000 tons to 370,000 tons and that, in addition, arrangements have been made to import 30,000 tons of basic slag and 17,500 tons of North African phosphate for topdressing. Further steps have been taken to integrate rail, road, and sea transport to expedite deliveries. Fertiliser bags, however, are in short supply and all farmers should take care to conserve bags and return them promptly to recognised dealers.

The increased allocation of fertilisers for topdressing should definitely increase production in the current year, but farmers should now formulate plans to obtain full benefits from the additional supplies this year and in future years. Maximum efficiency from topdressing can be obtained only from pastures composed of highly-productive strains of grasses and clovers, and the orderly replacement of much inferior grassland with new pastures sown with Certified grass and clover seed is essential in the future. The potential increase in efficiency and quantity of production through the wider use of these improved strains of pasture plants is enormous and should be the foundation of our grassland farming development.

Pasture improvement is just as important on hill country as on ploughable land, which in the past has received the greatest attention from topdressing. The introduction of clovers, particularly subterranean clover in the drier areas and *Lotus major* in the wetter and hill-country pastures, accompanied by light topdressing is the one development that alone can save much of our marginal land. Scrub control by hand can never save hill-country pastures; we must rely on plants and animals, and develop pastures which will enable the requisite stock-carrying capacity to control reversion and closer swards to prevent erosion. Erosion control is one of our immediate and pressing problems, and I know that farmers will willingly take an increasing interest in this work, for no farmer wishes to see the soil under his control lost or destroyed. Control work is now being placed on an organised basis through the Soil Conservation and Rivers Control Council and the Catchment Boards, who will provide the advice and assistance necessary to help farmers. The primary work, however, must be undertaken by the individual farmer, because the control of erosion on hill country requires the development of better pastures, controlled grazing (generally involving an increase in the proportion of cattle to sheep), spaced tree planting, the stabilisation of land in the upper gullies through the erection of debris dams, and other works which normally would be planned and carried out by the occupier of the land.

Meat and Dairy Produce During the war the sheep industry expanded, but dairy cow numbers declined slightly, and our immediate task is to rebuild the country's dairy herd to the pre-war level of 1,800,000. The settlement of ex-servicemen should greatly assist in this objective, as dairying affords the most efficient use of our best pasture land areas.

There are, however, certain aspects of dairying which require renewed attention in improving the efficiency of production. The most important is the improvement of the winter and early spring feeding of dairy cows. No other single factor will more rapidly promote higher or more efficient production. With an increase in the quantity of topdressing fertilisers during the coming years, every effort should be made to conserve the surplus summer production of grass as hay and silage for winter feeding so that the maximum benefit may be obtained from the increased pasture growth gained by topdressing.

Another factor in dairy farm production which requires careful attention is the improvement of pork and bacon production as a sideline to dairying. I am gratified to see that the National Pig Industry Council has extended its educational work in bringing before farmers the importance of their using surplus separated milk and whey to the best advantage. At a time like the present when food is so scarce it is wrong that such highly-valuable food as separated milk should be wasted. Where it is not used for other purposes it should be used for pig feeding, where it will profit the farmer and aid the people of Britain. Furthermore, dairy farmers could make much wider use of the pig crop subsidy scheme, for neglect in the provision of winter supplementary feed is one of the chief reasons for not using the summer surplus of separated milk to the best advantage.

Cereal Production At the moment shortage of cereals is one of the pressing problems in New Zealand, and I urge farmers on suitable land in the main cereal areas to increase production during the 1947-48 season. I do not expect that the country should be self-sufficient in cereal production, as this would not be making the best use of our lands, but at the prices now being paid for cereals, their production on suitable land offers farmers a better return than they could secure from purely livestock farming. Thus both from the individual and national view an increased cereal acreage in 1947-48 is desirable.

Farming Efficiency The advancement of better farming involves two stages—the development of improved practices either by individual farmers or by research workers, and the adoption of those practices by the great bulk of farmers. The main developments during the next decade are likely to be in the intensification of grass farming. I feel that so far we have only touched the fringe of developing our potential production. I intend to foster the spirit of co-operation which has served so well in the past between the instructors and research workers of my department and the farmers so that farming may rapidly benefit from the results of research. We must continue to improve the productive capacity of our pastures, decrease the toll of livestock diseases, improve the quality of our products, and make the fullest use of labour-saving machinery. With advances on these lines New Zealand farming will be in a position both to increase production and meet competition.

THE JOB OF THE WHEAT GROWER

In normal times, the production of livestock and crops in New Zealand achieved a remarkably good balance . . . a balance that provided a sound farming economy, favourable export markets and a well-supplied domestic market. The stress of war years inevitably distorted the farming pattern. Now is the time to regain the benefits of pre-war farming practice. The job of the regular wheat-grower today is to make every acre of wheat-growing land produce wheat. There is an assured market for every bushel of wheat harvested next season — and a guaranteed price that will not be less than 7/4 F.O.B. South Island. The greatest contribution that every farmer can make to the sound farming economy of New Zealand — as well as to badly needed world food stocks — is to do the job that he knows best, and to do it as thoroughly as he knows how.

Grow Wheat . . .

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THE HOME GARDEN IN APRIL

"There can be no vigour in the nation where there is no vitality in the land."—Prof. Kay.

VEGETABLE crop production efforts will be at a minimum during April, but other highly-important work must be done if the high standard of soil fertility necessary for successful vegetable growing is to be maintained—and it should be acknowledged that upon this basis depends the physical well-being of the whole community. Soil fertility is directly reflected in the quality of vegetables produced.

By D. K. PRITCHARD, *Instructor in Vegetable Culture, Wellington.*

THE following are crops requiring attention and the cultural methods recommended at this time of the year:

Cauliflowers

In districts subject to early frosts cauliflowers should be hastened to maturity by the methods recommended in the February issue of the "Journal." Tall plants exposed to high winds may be supported either by stakes to which they should be temporarily fastened or by placing soil against the stem. When feeding roots near the surface are broken by the swaying movement of the plant liquid fertiliser does not become so readily available and maturity is delayed. The curds of true specimens of cauliflower plants are tender and will be damaged or destroyed by frosts.

Spring Cabbages

In most districts young spring cabbage plants are set out during April to provide early spring supplies and a succession of green vegetables following the winter savoy cabbages. A part of the garden which will give protection from cold southerly wind and rain will be an advantage in securing early maturity.

A fertile soil that is well drained and contains plenty of lime is of the utmost importance for this crop; if the area it is intended to use is poorly drained, the plants should be set in a raised bed.

Blood and bone manure mixed with half its weight of superphosphate broadcast at the rate of 5 to 6oz. a square yard and worked into the topsoil before planting will give good cropping results. A topdressing of wood ashes after planting will supply the necessary potash. No farmyard manure or compost should be used in preparing the soil for spring cabbages planted during autumn.

Where all cultivation is carried out by hand tools the distance between plants need not be greater than 12in. each way, and the bed should be only of sufficient breadth to permit all work to be done from the sides so that "setting" the soil by treading on it while wet will be avoided.

From April and throughout the winter damage to plants by aphis will be negligible, but caterpillars, slugs, and snails may be troublesome. When spraying tomatoes and celery with Bordeaux mixture to which arsenate of lead has been added the spring cabbage seedlings should not be overlooked. Arsenate of lead is a stomach poison, and will kill any caterpillar which may eat only a small portion of a leaf that has been sprayed. Fresh hydrated lime liberally applied along the rows—always in the evening as late as practicable—will destroy slugs and snails without injuring or retarding growth of the plants.

In the South Island and the lower half of the North Island the variety of cabbage specially recommended for this planting is Flower of Spring. In the Auckland district a ball-headed variety of Henderson's is usually grown.

Home gardeners should realise that successful production of cabbages for early spring cutting requires considerable gardening experience, knowledge, and skill, and it is essential that plants set out as recommended above should be given every possible attention, particularly during May, June, and July.

Tomatoes

In most districts where tomato growing is successfully carried on supplies of tomatoes will be considerably lessened by the end of April. In the February issue of the "Journal" recommendations were made which would assist in prolonging the productive life of the plants; but from April all efforts should be directed toward securing the top-borne fruits either in ripe condition or so matured that they will ripen after being picked.

When it has been decided to "stop" the plants, and this should be done during April, only the top growing point should be removed and no more of the foliage; this is most important. All top foliage should be retained and preserved as long as possible; it will protect the fruits against inclement weather and very light frosts. Experience has proved that high-quality tomatoes can be obtained from the vines under this top protecting growth. No artificial protection, however efficient, can equal the "mothering" effects of plant foliage.

Spraying the plants at 8- to 10-day intervals with home-made Bordeaux mixture will greatly assist in protecting the foliage and fruit against the ravages of fungoid diseases.

When weather conditions become such that there is little chance of further ripening of fruits remaining on the vines all those which are fully matured should be picked and placed in a building where the temperature is above normal. (Late ripening of tomatoes is one of the many apparent advantages of the small glasshouse referred to in the January issue of the "Journal.") These fruits should **not** be packed in boxes. Placed on shelves—preferably covered with straw—and not more than two deep, most of the matured fruits will ripen, although ripening will take longer than usual. When tomatoes are picked for storage all stems should be removed. This will prevent some being "punctured" when they are placed on top of each other.

Spinach

Seed of the prickly or winter variety of spinach sown thinly in early April in favourable districts will produce a worthwhile crop before very cold weather begins. For late autumn sowing light, fertile soil is desirable. When the plants are about two inches high an application of nitrate of soda 1oz. to 9ft. of row will be beneficial. If this is done during a dry spell, the spinach rows should be given a good watering **before** the nitrate of soda is applied. After the application it is advisable to work the fertiliser lightly into the soil. When using nitrate of soda as recommended above **none of it should come in contact with any part of the plants to which it is applied.**

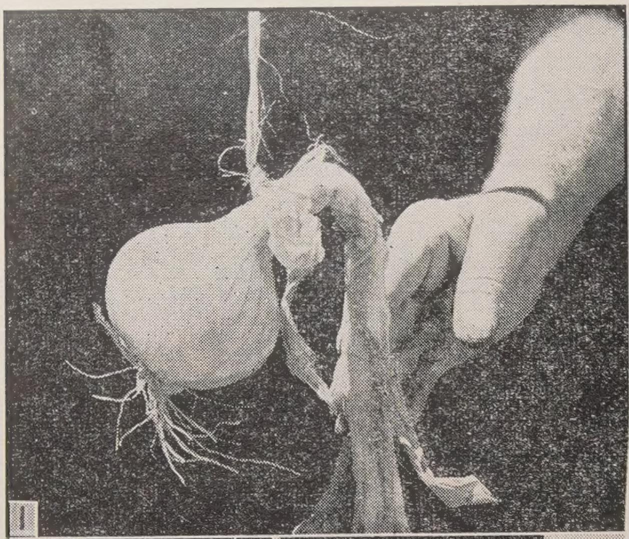
Asparagus

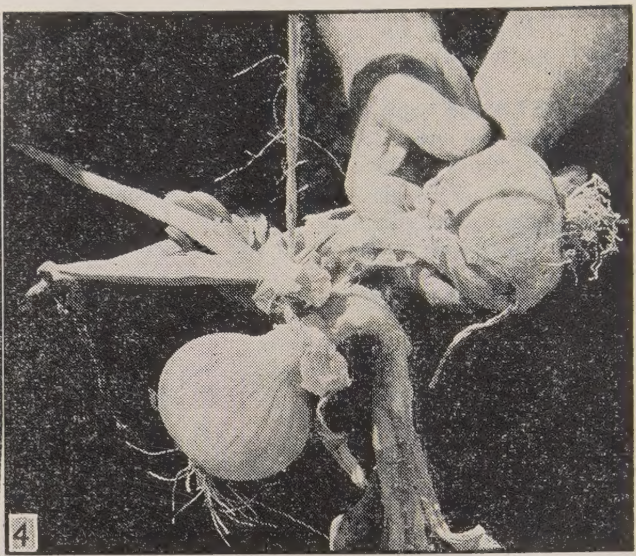
Top growth of asparagus should **not** be cut and destroyed until it has changed colour from green to brown. This change in colour indicates that the foliage has fulfilled its purpose and is no longer of any use to the dormant crowns. After the growth has been burned the ashes should be broadcast over the bed, which can be thoroughly cleaned and given a shallow hoeing. A light mulch of farmyard manure will be beneficial.

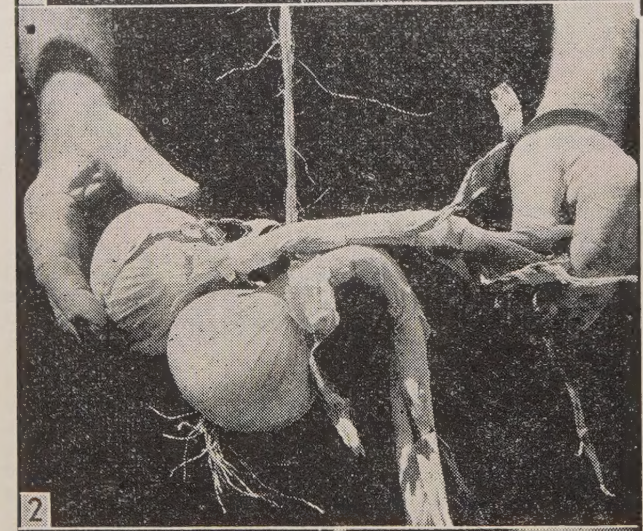
Leeks

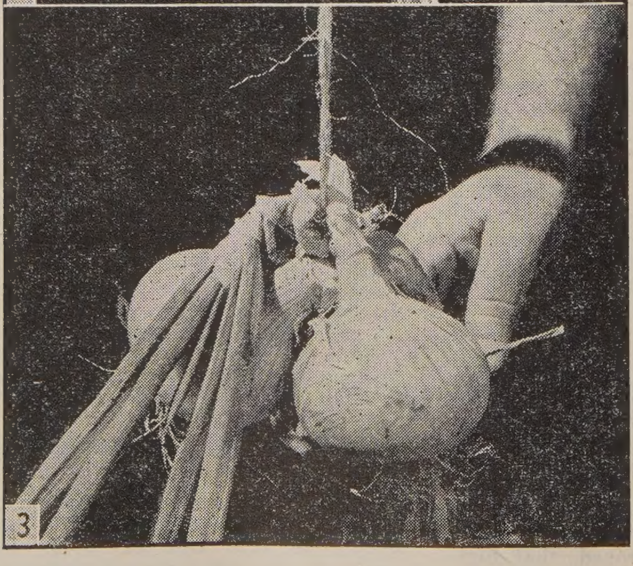
Leeks are an important addition to winter green vegetables. The bed should be kept free of weeds and copiously watered during dry weather,

A SIMPLE METHOD OF STRINGING ONIONS









AFTER fastening the first bulb the following operations are simple:—

Each bulb is held in the right hand; the tops are passed behind and with the left hand brought completely round the string while the bulb in the right hand is quickly placed on top of them. This continues until the string is completed.

Binder twine doubled and twisted is quite suitable to hold 25 to 30lb. of onions. The two loose ends are knotted, then fastened securely to a bulb with a good stout "neck," as shown in Fig. 1.

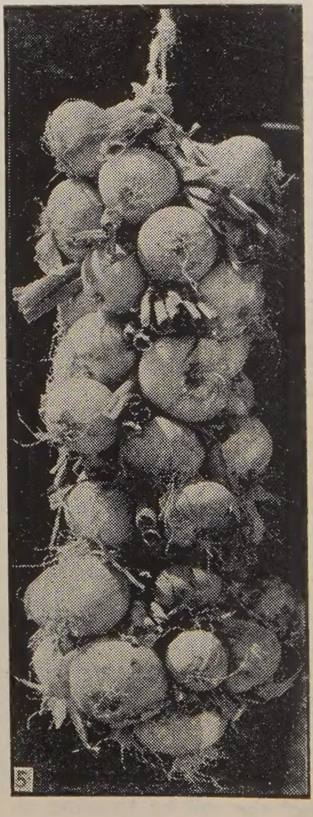
Fig. 1.—First onion fastened at the end of the string. This should be done securely, as it is the basis of the operations which follow.

Fig. 2.—The proper method of starting the "locking" process.

Fig. 3. — The bulb and the tops have been passed almost completely round the string.

Fig. 4.—The tops have been passed under the bulb, which has been placed on top of them, thus completing the "locking" operation.

Fig. 5.—The completed string ready for hanging in any outbuilding where there is always a good air circulation.



[Photos by Photo News Ltd.

as lack of water and fertiliser is reflected in spindly stems and sparse leaf growth. Such specimens are unattractive; neglect of proper cultivation is too often the cause of failure to grow a creditable product.

It is too late in the season to remedy any mistakes which may have been made when the soil was being prepared, but liquid manure applied weekly between the rows will do much to produce a good crop. When hoeing is being done the surface soil should be merely scratched; this will prevent destruction of roots near the surface and do much to assist maturity.

Celery

During late autumn and early winter celery plants are highly susceptible to attacks of late blight, which may be prevented by spraying every 8 to 10 days with Bordeaux mixture. Liquid manure applied as advised for leeks will stimulate the plants to fresh growth, and it is these newly-developed parts which require most protection. Sprayed regularly at the right time, celery may be available from the ordinary kitchen garden right through the winter.

Swedes

It is to be regretted that the production of swedes, which are now recognised as one of the most valuable winter vegetables, is too often neglected. In ordinary garden soil swedes are easy to grow, but they are subject, though rarely, to two non-parasitic diseases, cracking or splitting and brown heart, which seriously impair their usefulness.

Growth cracks may appear on any part of the bulb, and although these cracks sometimes become calloused and are consequently more or less sealed against secondary infection, they are occasionally invaded by bacteria causing a soft rot which renders the roots unfit for use.

As with carrots, these cracks are the result of uneven development, usually caused by variations of moisture content of the soil. To ensure steady, continuous growth careful attention to cultivation is necessary, while at the same time the roots should always be supplied with sufficient water for their requirements.

Brown heart is also known as black heart and dark centre. The disease is easily recognised in swedes; turnips, too, are sometimes affected. The outside does not show any indications of internal affection, but when the root is cut through the centre at a right angle to the stem, brownish, sometimes black, markings are revealed throughout the flesh. Bulbs affected with brown heart become tough and unpalatable when cooked.

The cause of this disease is stated to be a deficiency of boron in the soil, which can be remedied by the application of borax, not more than 1½ to 2oz. to 30 square yards. This small quantity can best be applied when mixed with dry sand or soil.

STORAGE OF VEGETABLES

Most vegetables which can be stored after harvest mature in the autumn.

Potatoes, especially when intended for storage, should be dug carefully and tubers should not be roughly treated when being bagged or put into containers. Only specimens free from damage or disease should be selected for storage. Pitting or clamping is rarely necessary for the small crop from the home garden. Bagged or put in boxes and kept in a cool shed, sound tubers will remain in good condition for months. Periodical examination and the removal of any potatoes which show signs of disease are necessary for best results during storage. Precautions necessary for the prevention of infection by the potato tuber moth were described in the February issue of the "Journal."

The range of temperature and humidity for vegetables which can be successfully stored varies with the variety. For beetroot, carrots, parsnips, swedes, turnips, and kumaras a higher humidity is required than for pumpkins, marrows, and squash. The former varieties can be successfully stored in much the same way as that recommended for potatoes. Gourds, however, will remain in best condition if kept in a dry, airy shed, preferably on a bed of straw, where the temperature will not be below 45 degrees F.

For the guidance of home gardeners who may wish to store root crops outside the accompanying illustration indicates how a clamp or pit should be built. Moist sand is sometimes put among the roots being stored.

PLANNING FUTURE PRODUCTION

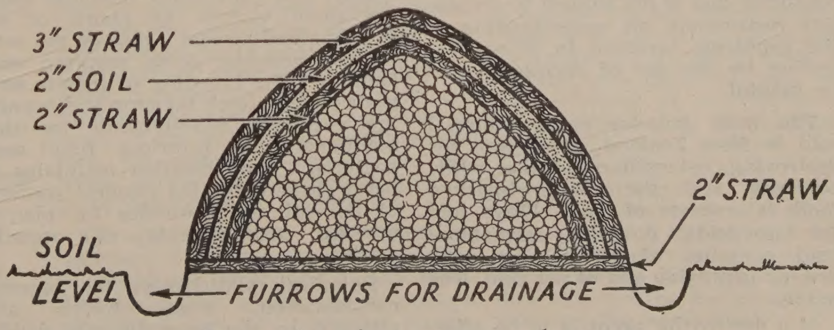
Gardening operations of the vegetable-growing season now drawing to a close should be reviewed now and future production planned. Notes taken during the season should be consulted and the reasons for crop failures sought. Alterations in seed sowing or planting dates may be necessary; if this is desirable, plans can be laid in accordance with experience gained. If certain varieties of vegetables are considered unsuitable, these can be changed and the names noted for future reference. Seedsmen's catalogues may be consulted and much valuable information obtained.

Some vegetable crops are more valuable than others, and the question, for instance, whether dwarf beans are more profitable to grow than a climbing variety is worth consideration. In deliberating on the increased crop which may be obtained from "climbers," the area of land occupied and its position in the garden are factors which have to be determined. Dwarf beans will occupy long rows in the garden, while a climbing variety may be grown on a fence or on a tripod of three long stakes set in almost any corner where space is available.

There are at least three varieties of rhubarb that may be considered for production in the home garden. One of these will grow a crop during spring and early summer; another will produce its crop in winter, and the third is called Everbearing, a name which implies its characteristic. A decision should be made as to which variety is likely to be most suitable. If, since the crowns were planted, it has become apparent that a more suitable place could have been chosen, and that crop rotation could be much more easily adopted if a change of position were made, the appropriate time should be chosen to make the change.

Assuming that plant rows in the garden run approximately north and south, have tomato plants been grown close to and on the east side of an asparagus bed? If this has been done, the shadow cast by the tall asparagus fern growth during the afternoon should be noted, as, from March to the end of the growing season, the tomato plants will not have a favourable chance to produce the best crop. Cutting down the fern growth may be contemplated, but reasons have already been given in these notes why this should not be done.

The instances given above should serve to stimulate further interest in



Storage clamp for root crops and potatoes.

investigating the possibilities of changes in future garden operations and planning. Consideration in the direction indicated may result in higher efficiency, greater economy, and increased crop production. Experiences of the past should be the best guide to the future.

DEEP DIGGING VERSUS SURFACE CULTIVATION

That deep cultivation is not only unnecessary but harmful to soil structure has been the opinion expressed in some recent publications that have aroused the interested comment of agriculturists, and experienced horticulturists have given their views on the controversy. Many British gardeners whose opinions have been formed after years of practical experience contend that deep digging accompanied in certain kinds of soil by trenching is at all times beneficial to plant development irrespective of the crop grown. Better drainage is secured and weeds and weed seeds are so placed by deep digging that subsequent weed control requires less labour and young plants do not have the same struggle for existence in the early stages of growth.

The advocates of deep digging do not admit that this means bringing subsoil to the surface. Shallow soils can be improved by bringing up a small quantity of subsoil each year. By this process, and by the systematic incorporation of organic matter, shallow soils can be greatly improved and brought to such condition that good tilth can be obtained with normal labour. In light, sandy soil, and under high temperatures surface cultivation, it is submitted, has some merit.

SPRAYING OR DUSTING CABBAGES, etc.

As substances more or less poisonous to human beings are widely used for the protection of vegetable crops against pests, the lethal effects of residues remaining on treated plants should be understood.

In some countries excess of poisonous residues on vegetables sold to consumers is prohibited. Where, however, the producer may also be the consumer and is not subject to legislative restrictions, an understanding of the problems involved in plant protection by the use of chemicals may be helpful.

The most popular spray material sold in New Zealand at present for destroying caterpillars of the white butterfly and the diamond-backed moth is arsenate of lead. When sold for insecticidal purposes arsenate of lead contains about 32 per cent. arsenic pentoxide and 64 per cent. lead oxide.

If a destroying agent is to be effective, the whole of the cabbage should be treated, and a larger quantity of the spray comes in contact with the outside leaves than the heart.

Plants sprayed during dry weather are more likely to have a higher percentage of poisonous residues than those which grow through rainy seasons and are eaten during late winter and early spring. Exposure to rain or heavy overhead watering is considered highly effective in washing the sprayed substance from treated plants.

If outside leaves are discarded and only the hearts of sprayed cabbages used, the risk of carrying poisonous spray residues into the kitchen may be practically eliminated. As an additional safeguard spraying or dusting plants with any arsenical mixture is not recommended later than six weeks before harvesting. Plants being attacked by the pests mentioned above should during this period be dusted with derris, which is equally effective as an insecticide, but may be more costly. The active ingredient of derris dust as sold is rotenone, which, while being poisonous to chewing and sucking insects and other lower forms of life, is considered ineffective as a poison to human beings.

Home gardeners applying dusts containing arsenical poisons are warned against inhaling any of the concentrate, and when a quantity is being applied the use of a respirator is advisable.

CROP ROTATION

Mixed farming is carried on more profitably where a system of crop rotation is practised, and the principle is equally applicable to the production of vegetables in the home garden, although it may not be possible to practise it to the same extent.

Wherever annual cropping is carried on crop rotation is now recognised as a necessary cultural practice. Evidence could be submitted to prove its economic advantages, in increased crop returns, disease and insect control, improvement in soil conditions, and increased fertility.

Nutrient requirements of crops differ widely, and continuous cropping with the same variety of plants or of closely-allied species exhausts the soil of the particular foods required and facilitates the breeding of insects and pests which attack the crop and supply the necessary requirements for the maintenance of injurious fungi and bacteria. Crop rotation maintains a better balance of the mineral content of the soil and provides for plants' varying requirements of organic matter.

Botanical relationships, too, require consideration; crops which are attacked by the same diseases should not follow each other in rotation. Temptation to over-crop with a variety which may be considered of greater value or which may be more easily or more economically produced should be avoided. Root crops should be followed by leaf crops, beans, or peas. The old adage that a crop which produces its edible part under the surface should be followed by one the edible part of which is produced above the surface is a sound one. It is also considered good practice to follow a heavy-feeding crop by one which requires less plant food.

The effect which the growing of a successful vegetable crop has upon a following crop is one which has not been studied fully. The heavy liming necessary for successful spinach growing may not create the best soil conditions for potatoes as a following crop. In an experiment recently carried out at Rhode Island, U.S.A., it was found that the yield of an onion crop following cabbages or swedes was lower than when the same variety followed potatoes or squash. Beets left the soil in a more acid condition, and were found to reduce substantially the yield of onions which were planted in succession. Lettuce yields were heavier after beets or potatoes than after peas or cabbages.

It is not possible for the home gardener to do more than make observations and, for future guidance, note yield differences which may occur when certain vegetable crops follow others. It is, however, a phase of cultural investigation which, because of its economic importance, appears to warrant further consideration.

Cropping experience shows that such crops as lettuce, onions, and spinach return to the soil little plant waste to form organic matter, and where practicable these crops should be followed by cabbages, peas, or beans, which return to the land on which they are grown substantial quantities of crop residues.

When the area which was occupied by a deep-rooting crop just harvested

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Care of Wet Grindstones

APART from being kept adequately moistened during use, a wet grindstone normally does not need any special care. If it becomes glazed, it can be improved by a rough dressing.

To give the dressing hold a piece of ¾in. galvanised pipe on a rest at the back of the stone, and while the stone is revolving backward dry press the pipe against it. This will produce the rough corrugated surface necessary for wet grinding.

Wet grindstones are supplied in various grades of hardness, the soft to medium coming from the Blue Mountains, Australia, and the medium to hard from Newcastle, England. As it is a natural sandstone, the usual wet grindstone cannot harden with age.

has been dug it is possible that a shallow-rooting crop may benefit considerably from the improvement in soil conditions created by deep root penetration of the previous crop. Early and late-maturing vegetable varieties can be followed by crops which occupy the ground much longer.

The advantages of crop rotation are summarised as follows by H. C. Thompson: "Many serious diseases can be controlled in a practical way by systematic rotation. Club root of cabbages and other crucifers can be controlled by keeping the land free from cruciferous crops and weeds for two years. Potato scab and onion smut cannot be controlled by ordinary rotation, since the organisms involved live in the soil for several years. In planning a system for insect control one should follow a crop by one known not to be attacked by the same insect."

SHELTER

Throughout the Dominion many new home gardens are being established for which adequate shelter should be considered as primarily necessary for profitable vegetable production. The devastating effects of high prevailing winds on vegetables are often observed, and success in vegetable growing cannot be achieved where crops have no protection against root disturbance. Labour, land, seeds, manures, and fertilisers are lost in efforts to produce high-quality vegetables under adverse weather conditions.

Vegetables should not, however, be treated like glasshouse plants. A reasonable amount of exposure is beneficial, but no vegetable can produce its best if its feeding roots near the surface are disturbed and broken by the swaying motion of its top growth caused by lack of protection from high winds.

Tall-growing varieties such as broccoli, cauliflowers, kale, Brussels sprouts, climbing beans, and tomatoes are likely to suffer most unless adequate shelter is provided. No matter how these vegetables are staked and fastened or moulded up with soil, proper development and full maturity will be prevented by continuous exposure to high winds.

IMPORTANCE OF WATER IN SUCCESSFUL VEGETABLE PRODUCTION

The following approximate percentages of water content of vegetables usually grown in the home garden show the importance of sufficient water being available to the plants:—

Vegetable.	Percentage of Water.	Vegetable.	Percentage of Water.
Asparagus	93	Leeks	88
Beans	88	Lettuce	94
Beets	87	Onions	87
Cabbage	92	Pumpkins	90
Carrots	88	Squash	90
Cauliflowers	91	Tomatoes	94

Watering the garden will be done more intelligently if the functions of water in plant life are better understood and the high water content of vegetables is realised.

Water is the solvent of plant food in the soil, and by and through the roots plants obtain the nutrients necessary for growth and development. Inside the plant water is the medium of distribution to plant tissues of foods elaborated by the plant itself. Surplus water is transpired by the plant through the leaves, and it is reliably estimated that about 300lb. of water is transpired for every pound of solid matter developed by the plant. Water is therefore necessary for all the physical changes of plants.

Competent authorities have stated that one inch of water is necessary every seven to ten days for successful vegetable growing, and that during specially-dry periods more may be required. The need for a plentiful water supply for the garden should therefore be evident.

On areas of land covered by glasshouses in which tomatoes are grown and unaffected by the usual heavy winter rainfall it is often advisable to apply over 27,000 gallons of water an acre three times between crops. This means the application during winter of over 300 tons of water an acre on land not exposed to atmospheric conditions.

All parts of plants do not contain the same proportion of water; roots usually hold the greatest percentage. This, however, does not imply that plant roots should be submerged in water. Applications of large quantities will depend on drainage efficiency. Few vegetables will remain healthy when their roots are over-supplied with water.

Surplus water taken in by plants is evaporated from the leaves, this process being termed transpiration, and experiments have demonstrated that from a square foot of the surface of a sunflower leaf there will pass into the air about four ounces of water in 24 hours. This means that in 100 growing days a sunflower plant will transpire 25lb. of water a square foot of leaf surface. At the estimated rate of transpiration of a healthy 30-year-old apple tree an acre of 40 trees would transpire 600 tons of water a year. Figures published in the October, 1946, issue of the "Journal" showed the quantity of water required for the growth of one cabbage, and when a full assessment is made of the quantity of water necessary for vegetable growing in the home garden the important part it plays will be better understood.

Though water in abundance is necessary for vegetable plant growth, it should not be applied at any time. The early part of the day is always considered best for watering plants. Water applied on dull days and in the absence of sunshine may cause plants to be attacked by injurious fungi.

Soil condition also plays an important part in the quantity of water which may be used. Where organic matter is plentiful the soil will be more retentive of water and less will be necessary. Soil in this condition will not be subject to loss of nitrogen through leaching to the same extent as light soils low in organic matter content.

When undecayed stable manure or matured green manure crops are dug under during late spring or summer, moist soil conditions are essential for decomposition, and heavy watering will be necessary.

THE IDEAL SOIL

"We may define the ideal soil as one in which plants of many different kinds flourish and grow prosperously. Such a soil will be reasonably deep; it will be rich in all the needful nutrients; it will retain moisture sufficient for the plants' needs through times of drought; it will be warm; its physical structure will be such as to encourage root development; and it will be easy to cultivate. Such is the ideal towards which we have to strive. Here we have the constituents of a fertile soil. All that is left for us to do is to discover how far our soil conforms to the ideal, and what we can do to remedy its faults. Sometimes it is relatively easy to come somewhere near it—we can never quite reach it; sometimes it is a long, laborious task which calls for all the patience and skill we can command."—R. B. Falconer, "Gardeners' Chronicle," 12.1.46.

This statement by an outstanding British authority indicates what the ideal soil should be, but home gardeners must make the best of the land available. By skilful operations and proper methods of cultivation the worst soils can be substantially improved, and incorporation of organic matter in all types of soil is invariably the dominant factor which brings about the desirable condition of fertility and good tilth.

In the agricultural sense "the soil" is just the top few inches of the earth's crust, and upon it all life depends for its existence. Today a great responsibility rests upon the man who has the privilege of cultivating only a small portion of it. An understanding of appropriate cultural practices necessary for successful vegetable growing will lighten the labour inseparable from cultivation of the soil, provide useful employment for spare time in the garden, ensure adequate compensation for labour expended, and improve the health of those who consume the vegetables.

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CASE

TOPDRESSING PRACTICES

VALUABLE pointers on how to make the best use of the limited supplies of fertiliser available are given by P. R. Barrer, Instructor in Agriculture, Christchurch, in the following article, in which he deals with topdressing practices, with special emphasis on the important factor in these times of meeting the difficulty of supply in the wisest manner.

MOST farmers now recognise the value of fertilisers and lime in building up soil fertility and farm production. Experience, together with the results of topdressing and liming trials, has shown the results to be expected in different districts and on different soils. In few districts there is no noticeable response to the application of phosphates, but in some districts a response to lime or phosphate is obtained only when they are applied together.

As the necessity for the rationing of phosphates still exists, the farmer naturally has to see that the best use is made of the quantities of lime and phosphates available. Consideration may best be given to this matter now.

Best Season for Application

The best time for applying fertilisers depends on when results are desired. Topdressing is generally carried out not only with the object of increasing the total production of grass but also in the hope of making the seasonal production more even. Therefore, the intention is to obtain greater pasture growth during the late autumn, winter, and early spring. To do this topdressing in the autumn before grass growth ceases is most satisfactory. Topdressing in the spring will increase grass production when it is least required. There are cases where spring topdressing may be advisable, an instance being on paddocks from which it is intended to take a hay crop. Also a special-purpose application of sulphate of ammonia or ammoniated superphosphate may be made in the spring on paddocks which are to be shut up for grass seed production, or where the grass is not thriving. Inability to obtain fertiliser at the time of peak demand in the autumn is of course a difficulty and will mean that some farmers will be topdressing later than they would otherwise do.

In topdressing lucerne stands it should be remembered that lucerne is dormant during the winter, and phosphate application should not be made in the autumn when the weeds will benefit at the expense of the lucerne. Topdressing of lucerne should be carried out in the early spring, preferably after the first cut.

Pasture Establishment

In the sowing down of new pastures lime may be applied before the last harrowing in the preparation of the seed-bed. Phosphate should be applied at the time of sowing. Where responses are obtained to lime and phosphate their application is as essential for good pasture establishment as the preparation of the seed-bed, the sowing of good-quality Certified seeds, and sowing at the right time. If one or other of these factors is omitted, failure of the pasture may result. As the establishment of a pasture may determine its usefulness over a period of years, attention should be given to the sowing of fertiliser and lime at the correct time rather than when it is too late to do more than help to patch up a poor "strike."

What Pastures to Topdress

When fertilisers were plentiful the same consideration to the type of pasture topdressed was not given as is given now; many inferior pastures were brought up to a good standard by topdressing alone over a period of years, or in conjunction with the surface sowing of grasses and clovers. At present, however, the best results, though not the most spectacular, are obtained by using available fertiliser on the best pastures, where a choice has to be made between good and poor swards. Young pastures will generally merit topdressing in preference to older pastures, though this would not apply everywhere. On some soil types where deterioration of the sward without fertiliser can be rapid it may pay to prevent an older pasture from running out instead of topdressing a younger pasture which has had relatively generous applications.

Swards with good clover content will be better after topdressing than those which are mainly grass, because the clovers respond particularly to lime and phosphate, and also vigorous clover will provide supplies of nitrogen to ryegrass and other grasses so that they in turn become more vigorous.

Type and Quantity of Fertiliser

The choice of phosphatic fertilisers lies mainly between serpentine superphosphate and straight superphosphate. In the many districts where trials have shown serpentine superphosphate to be equal to or superior to superphosphate, serpentine should be chosen, as 27cwt. of serpentine superphosphate is allocated in place of 1 ton of superphosphate. This increases the area topdressed in the ratio of 27 to 20.

It is not possible to make a general recommendation of the quantity of fertiliser to apply an acre, as there is such variation both in soil type and rainfall throughout New Zealand and farmers are restricted at present by the amount allowed under rationing. However, it should be remembered that an annual application of one bag of fertiliser an acre is usually preferable to applying two bags every two years.

The use of potash in certain localities has been shown to be necessary for the best results. Nitrogenous manures may also be of value for encouraging unthrifty pastures or for seed production.

Special problems arise on other soils. The use of cobaltised superphosphate should now be a regular practice on areas which have shown cobalt deficiency. On the copper-deficient peat soils which occur to a limited extent in New Zealand an annual dressing of 5lb. of crushed bluestone an acre is suitable. The bluestone may be applied alone or mixed with lime, superphosphate, serpentine superphosphate, or other commonly-used manures. Deficient areas on such farms should be topdressed with bluestone for satisfactory results. Copperised superphosphate may be used as an alternative.

Utilisation of Growth

The farmer has not made the most use of phosphate merely by applying it at the right time and to the most suitable paddocks. Fertilisers are applied to improve growth for the best use by stock, and it is in feeding off these pastures that the ultimate value of topdressing is realised. The grazing of topdressed areas in particular should be controlled.

This controlled grazing means that the pastures should neither be continuously nor closely grazed, and should not be allowed to go to rough growth in the spring and summer. Topdressing has its greatest use when it gives more growth in periods of feed scarcity, but to produce most growth at this time the topdressed pastures must be wisely spelled at other times.

K.P. FERTILISERS

The advertisement which appeared on page 202 of the February issue of the "Journal of Agriculture" referred to K.P. products, manufactured by Kempthorne, Prosser and Company's New Zealand Drug Company Ltd. Because of a printing error the brand name "K.P." was omitted before the words "high-grade fertilisers."

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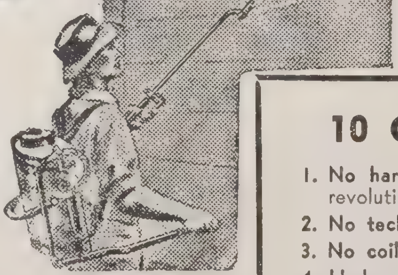

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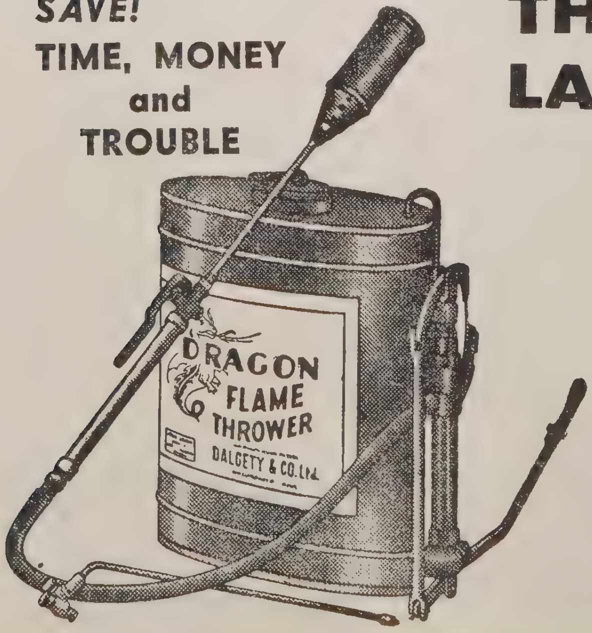

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Managing Pullets for Winter Egg Production

By F. C. BOBBY, *Superintendent of Poultry Husbandry, Wellington.*

WITH the present shortage of eggs and the accentuation of that shortage during the winter months, winter egg production assumes even greater importance than in more normal times, though it is always important because the higher price of eggs in that season vitally affects the income from a laying flock. The winter has not yet been reached, but the method of handling a flock of laying birds beforehand has a considerable bearing on production during the winter. A number of factors which affect winter egg production are discussed in this article.

WINTER egg production is an inherited characteristic, and therefore pullets which are known to have laid consistently through the winter are valuable as breeding hens in the following spring. Though it is difficult to be certain about winter production unless trap nesting is employed, ordinary egg recording per house or flock unit will indicate the qualities of pullets. If a flock does well through the winter and other required attributes are satisfactory, those birds should receive first consideration as breeders.

Though that point cannot be made use of for 1947, it should be borne in mind in future breeding programmes. It is not uncommon for commercial producers overseas to trap nest pullets for the three winter months, when work on the farm is less than at other times of the year, to find the best winter producers from which to select breeding birds later. For the same reason special awards are often given to pens of pullets putting up the best egg scores during the winter at laying trials. Winter production as an inherited characteristic should not be overlooked if the best results are to be obtained from egg production.

Time of Hatching

Without doubt winter egg production is influenced by the date at which pullets and September-hatched light-which they are reared to the laying stage. Though there may be much to be said for the well-grown, early-hatched pullets which rear easily and often with low mortality, there is always a risk of an autumn or early winter neck moult just as egg prices reach the peak for the year. To have a good flock of pullets out of production at that time is exasperating. Therefore it is generally considered that August-hatched heavy-breed pullets and September-hatched light breeds are the most successful for winter egg production. It must be admitted, however, that whether pullets go into a neck moult will depend largely on management and weather.

A point which must be emphasised is that late-hatched pullets, whether heavy or light breeds, usually come into production too late to supply eggs when prices are best; in other words they are not good winter producers. Pullets hatched out late in October and November do not rear as well as those hatched earlier in the season, and are often slow coming into production if the weather is poor.

Good Rearing Necessary

Good winter egg production depends to an appreciable extent on a good rearing season. Satisfactory production can be expected from well-bred birds which develop good frames and sound constitutions. Pullets should not be forced too quickly but allowed to mature quietly. Perhaps the most harmful condition for growing pullets, apart from an outbreak of disease, is overcrowding, which checks their growth and undermines their constitutions. There is little doubt that if that occurs egg production suffers later.

Pullets should be moved into the laying houses as soon as their combs begin to redden. It is desirable that they should settle down in their new quarters before coming into lay.

This is the time when a good bed of dry litter must be built up, as it is essential to avoid having to clean out after the summer weather has broken. Once new litter becomes damp in autumn or winter, maintaining dry litter in the house is almost impossible, and excessive cleaning out becomes necessary. Damp litter is dangerous, as it assists in bringing on colds, one of the worst detractors from satisfactory winter production. A good depth of dry litter built up in late summer is the best method of avoiding later trouble from damp floors. That is an essential management factor in winter egg production.

Winter Housing

The method of housing birds to ensure good production will depend considerably on the district and the winter weather expected. Good ventilation is essential, but warmth, freedom from draught, and dry conditions are all conducive to good production. Poultry producers in the South Island, where winter conditions are harder than in the North Island, favour laying houses low at the front and higher at the back. That type of house benefits to the full from the low-pitched rays of the winter sun and in consequence tends to be warmer than houses built with the reverse slope—high at the front and low at the back. Lofty, cold laying houses are far from ideal for winter production.

Local conditions will also have much bearing on whether birds are run intensively or semi-intensively during the winter. In districts subject to cold winds and rain, and where the soil is heavy, better production will be obtained in most cases by running the birds intensively, particularly if any grass run available is limited in size and well worn.

But the birds should either be run intensively throughout the winter or be permitted to run out at all times irrespective of the weather (snow-covered ground excepted). Keeping birds in when the owner considers the weather unsuitable and letting them out at other times often leads to colds. Birds can stand inclement weather if they have sound constitutions and good housing to return to after running outside.

[Photo News Ltd.

An intensive laying house suitable for winter egg production. Note the adjacent supply of greenfeed so essential for the health of the birds.

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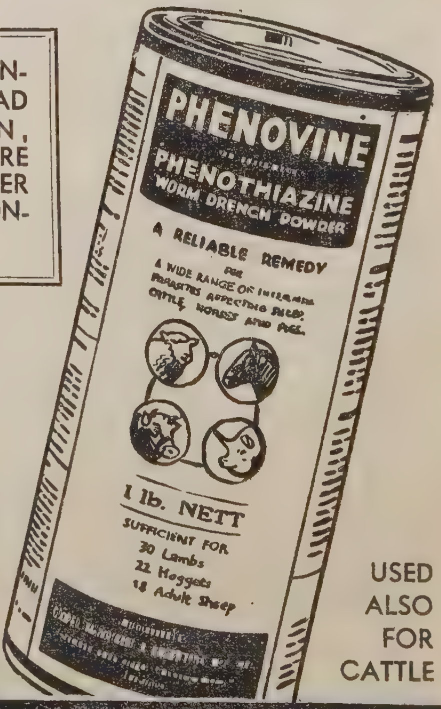
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Importance of Feeding

Without doubt the feeding programme for pullets during the autumn and winter is one of the most important factors in egg production at that time of year. Good and consistent feeding is difficult at present with poultry foods in short supply and regularity of distribution a major worry, but while acknowledging these difficulties, poultry producers will still be wise to give careful thought to feeding for winter egg production and to feed their birds as well as the situation at any time will permit.

Certain fundamentals must be examined. Unless pullets have inherent winter laying qualities, no amount of good feeding will produce the desired results. But if fecundity is inherited, good feeding is essential, the object being to persuade the bird to eat sufficient food to maintain body weight, maintain body heat in cold weather, and yet have a surplus to produce eggs. If birds which come into lay in the autumn are not given food of sufficiently good quality and in adequate quantity, they will produce eggs at the expense of their body weight. Once that occurs any check caused by bad weather, a change of food, or mishandling will put such birds into a partial or neck moult.

Food consumption must be in direct relation to egg production. The statement that laying birds in production can be overfed is a myth—they can be wrongly fed but not overfed. It is also true that during cold weather birds require more feed to maintain body heat—after all, the same applies to human beings. Finally, food is required to make those winter eggs; they cannot be produced from an inadequate amount.

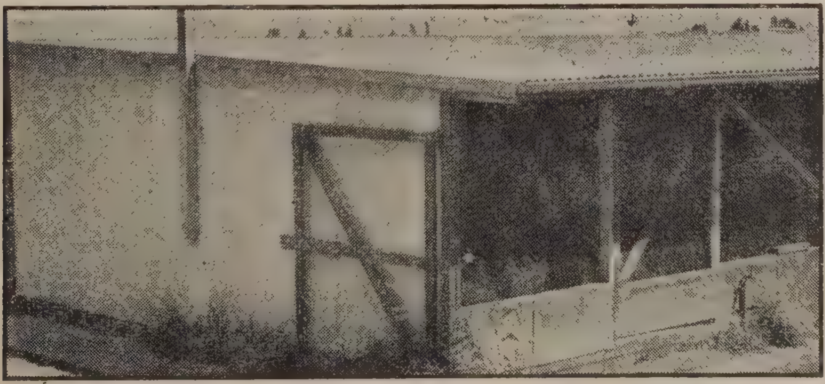
In winter pullets require increased quantities of protein-rich foods. Without extra protein the pullets may not be stimulated into satisfactory production. They depend almost wholly on the owner for protein at that season, as insects, worms, and natural proteins are almost unavailable even if the birds are running out.

Free range for growing stock builds up the constitution required for winter egg production.

Adding extra meat meal to the mash in winter is not necessarily forcing, though it would be if given in early autumn when the birds are coming into production or in spring when the natural flush season occurs. A winter laying mash can well carry 15 per cent. of total digestible protein without being forcing. That means in the average mash up to say 10 or 12 per cent. of 60 per cent. protein meat meal. Where maize meal is available up to 20 per cent. in the mash is an excellent winter feed.

Artificial Lighting

The best evidence about the quantity of food required is the value of artificial lighting during winter. There is a mass of practical evidence, experimental and commercial, to demonstrate that lighting in winter is a successful aid to production. The reason is the increased food consumption and not, as is sometimes suggested, that the birds are active for a longer period of the day. Activity helps to maintain their health, but it is the food that produces the eggs. Thus winter lighting of pullets' laying houses can be recommended, but poultry producers are urged to use this lighting in the manner found by experiment and experience to be most efficient while yet not placing an undue strain on the birds. Details of artificial lighting for winter egg production may be obtained from the Department of Agriculture.



[Green and Hahn Ltd.

A lean-to laying house with a low front favoured in the colder climate of the South Island and claimed to be an aid to winter egg production.

Where lighting is not practicable food consumption during the shorter winter days may be increased by careful feeding management. With birds fed dry mash and grain an extra feed of wet mash in the afternoon before the grain feed will help. If fed in the morning, this wet mash will only replace what the birds would have taken from the dry mash hoppers. If it is fed later in the day, the birds are induced to eat it in addition to their dry mash because of the palatability of wet mash. When birds are fed wet mash and grain it has been found that a feed of soaked grain, including meat meal, will induce greater consumption, particularly if given early in the morning as soon as the light will permit.

Whatever the system, a full grain feed at night, including where possible some kibbled maize, is a means of maintaining body weight. Any programme of increased feeding means increased labour, but in a cold climate that labour is amply rewarded in increased egg production.

Obtaining high winter egg production is skilled work: Production for the remainder of the year is largely a natural function checked only by mismanagement.

Colds are Expensive

Colds among pullets are probably the worst enemy to be faced by poultry producers during winter. If neglected they lead to roup and severe trouble, but even in mild form they reduce egg production to an extent that results in heavy financial loss. As all experienced poultrymen know, once colds start in a flock in winter they are particularly difficult to eradicate. The important point is to avoid these colds rather than to cure them. That is not always simple, but the following points should receive attention:

Avoid damp litter.
Avoid draughts in the laying house.
Avoid overcrowding.

Ensure good ventilation; stuffy houses are more conducive to colds than even moderately draughty ones.

Remove cull birds. A sickly, weak bird is often left among a batch of healthy pullets, and equally often these weak birds contract colds which remain with them for long periods. Such birds start an outbreak among the healthy birds and reinfect them after the healthy birds have been successfully treated. The bird of poor constitution is not only a poor producer or a passenger but a constant menace to the healthy birds in the pen.

Sulphathiazole Treatment

Many forms of treatment have been recommended for the common cold but most are only partially successful. Another method, and one that is stated to be effective, can now be added—the use of one of the new sulpha drugs, sulphathiazole. One pound of this drug in powder form is added to every hundredweight of mash in dry form and the treatment continued for three days. Sulphathiazole is expensive and requires a veterinary officer's prescription before it can be bought. With average food consumption treatment for three days costs 3d. a bird. If one or two eggs a bird are saved and the colds are eliminated, this treatment is really not expensive.

It must be made clear, however, that no claim is made for a cure of diphtheric roup by the use of sulphathiazole.

Green Food Essential

Most poultry producers today are so well acquainted with the necessity for feeding green food that no undue emphasis need be laid on this essential subject. Green food contains vitamin A, which is associated with the building up of a resistance to disease and troubles such as colds and roup in poultry. It will be appreciated, therefore, that the feeding of green food is essential in any programme for the production of winter eggs.

The method of feeding green food varies, but it is suggested that consideration be given to feeding it late in the day during the winter. Green food is bulky and birds' crops have only a limited capacity at any one time. If fed early in the day before a mash feed or incorporated as chopped greens in the mash, it must limit the quantity of mash which can be eaten. Though important, green food in itself is not an egg-producing food, and, as it has been demonstrated that increased mash consumption is desirable during the winter, the feeding of green food should not be at the expense of other consumption. If it is trough fed late in the day, the birds will still eat a reasonable quantity, as they have a natural desire for it, and the consumption of egg-producing and body-building foods will not be reduced.

❖

PEDIGREE SOW RECORDS

Contributed by the Livestock Division.

DURING the three months October-December, 1946, 26 of the 29 litters recorded were sufficiently good to be included in one of the five grades set out below.

Grade	Minimum Litter Weight.	
	At 3 weeks.	At 8 weeks.
1	120 lb.	360 lb.
2	100 ,,	300 ,,
3	90 ,,	270 ,,
4	80 ,,	240 ,,
5	70 ,,	210 ,,

Breed Averages for the Period

Breed.	No. of Litters Recorded	Litter Weight at		Number of Pigs.		Average Weight at	
		3 weeks. (lb.)	8 weeks. (lb.)	Born.	Weaned.	3 weeks. (lb.)	8 weeks. (lb.)
Berkshire ..	16	98.3	283.1	10.0	7.9	12.48	35.95
Tamworth ..	3	103.7	302.3	9.3	8.0	12.96	37.79
Large White .	7	116.3	361.3	11.7	9.3	12.52	38.91
Large Black .	3	103.0	309.3	11.3	8.7	11.88	35.69

A No. 3 grade litter is looked on as a good performance, No. 2 as excellent, and No. 1 as special.

The following list gives the names and addresses of the breeders of recorded sows and details of the litters:

Owner's Name and Address.	Herd Book No. of—		Litter Weight at		No. of Pigs.		Grade of Litter
	Sire.	Sow.	3 weeks. (lb.)	8 weeks. (lb.)	Born	Weaned	
Berkshire							
Raynes Brothers, Box 3, Patumahoe	20311	19380	94	259	9	7	4
Raynes Brothers, Box 3, Patumahoe	20311	20369	129	362	10	10	1
Otautau Pig Club (secretary, W. R. Ayson, Aparima R.D., Otautau)	21189	20448	87	294	10	8	4
Unwin, S., Stonycroft, Winchester	19666	16552	83	190	11	8	—
Davies, F. D., Buckland Road, Tuakau	20559	20664	99	309	11	7	3
Rowlands, T. E., Ruthin R.D., Kaiapoi	21227	21465	88	315	9	9	4
Ryan, J., Rotomanu, Westland	19872	20408	150	279	10	10	3
Cowan, G. T., Rotomanu, Westland	18450	18371	104	288	13	7	3
Cowan, G. T., Rotomanu, Westland	21917	21088	101	287	7	6	3
Jackson, K. W., Mountain Road, Inglewood	19583	20259	101	268	10	10	4
Unwin, S., Winchester	19666	16549	98	264	12	9	4
Hodgkinson, H. E., Rotomanu, Westland	18295	18278	115	339	10	7	2
Buckley, F. N., Waiterimu R.D., Ohinewai	21140	19814	93	321	15	7	3
Petrie, D. R., Waikuku R.D., Rangiora	19462	20814	76	238	9	7	5
Rowlands, T. E., Ruthin R.D., Kaiapoi	21227	19994	57	193	5	5	—
Rowlands, T. E., Ruthin R.D., Kaiapoi	6113*	19302	97	324	9	9	3
Tamworth							
Ogle, F., and Son, Normanby	13326	13423	130	355	13	10	2
Kaikoura Pig Club (secretary, R. R. McRae, Tullock Mains, Kaikoura)	14996	14276	121	364	8	8	1
Mahakipawa Pig Club (secretary, W. E. Bryant, Mahakipawa, Marlborough)	13588	15106	60	188	7	6	—
Large White							
Spackman, L. S., 501 R.S.A. Building, High Street, Auckland	6217	6344	141	399	13	9	1
Hutchings, F. S., Ngakuru, Rotorua	6593	6621	76	212	11	9	5
Whitelock, G. M., Kairanga R.D.	6669	6030	116	366	10	9	2
Whitelock, G. M., Kairanga R.D.	6398	6392	130	397	11	10	1
Rowlands, T. E., Ruthin R.D., Kaiapoi	21227†	6646	80	290	9	8	4
Twyman, W. A. H., Ngakuru R.D., Rotorua	6735	6196	116	352	13	9	2
Montgomerie and Bell, Ardmore, Papakura	6144	6402	155	513	15	11	1
Large Black							
Hunt, E. R., James Street, Whakatane	3691	4577	98	373	10	8	3
Hickey, G. W., and Sons, Kariotahi, Waiuku ..	4749	4210	114	286	16	11	3
Hickey, G. W., and Sons, Kariotahi, Waiuku ..	4749	4752	97	269	8	7	4

* Large White. † Berkshire.

Selection of Greenfeed Crops to Sow Now

By P. R. BARRER, *Instructor in Agriculture, Christchurch.*

THERE is still time to sow greenfeed crops for the winter and early spring, and the following article reminds farmers of the various aspects of such cropping. Various types of greenfeed are discussed with their limitations and advantages. The proximity of the frost period is made the deciding factor between the selection of blue lupins or temporary pasture or greenfeed cereals.

PROVISION for extra feed for the critical winter and early spring period can still be made at this time of the year. The choice of crops for greenfeed lies mainly between temporary pastures of Italian or short-rotation ryegrass, greenfeed oats or barley, and lupins, or combinations of these.

There are no districts in New Zealand where grass growth alone is sufficient for stock during winter and early spring, and the feeding of hay or silage or root crops at this time can be varied or augmented by the feeding off of greenfeed crops. During these months food is particularly important for dairy cows due to calve in the spring, for in-lamb ewes, and for young stock.

Climate, district, farm, and stock conditions will determine the type of greenfeed most suitable for individual farms, but it is useful to be reminded of the more important features of these crops.

Temporary Pastures

Italian and short-rotation ryegrass when sown early under good conditions have given, even in cold districts, a very high grazing capacity over the winter, but when sown late under poor conditions they may furnish no winter feed. In colder districts April sowings may be too late, and greenfeed oats or barley may be used instead. In warmer districts or on areas where seed production, not feed production, is the main aim, sowings may still be made with a fair chance of success. The sowing of broad red clover, cowgrass, Montgomery red clover, or white clover is usual with these grasses. For successful establishment of these clovers early sowing is very desirable, as the plants are not frost-hardy in the two-leaf stage.

Fertiliser and lime are necessary both with "temporary" and "permanent" pastures, while soil preparation should be no less thorough, a fallow being advisable. Of course Certified strains of seed are recommended, as both Certified Italian and short-rotation ryegrass are products of selections for high feed production.

Greenfeed Cereal Crops

Oats and barley are frequently sown primarily for greenfeed and may be fitted in after the harvesting of a grain crop. In a season when harvesting is late they are particularly suitable as a catch crop. As they are maintenance crops only, and not fattening crops, they require a mineral supplement. Oats may be sown alone or in combination with grass, lupins, or tares. Algerian is the variety most commonly sown for this purpose, especially in the North Island, where a rust-resistant variety is necessary. Garton and Dun are suitable first for greenfeed and later for grain or chaff, but Russet recovers particularly well for grain or chaff after providing greenfeed. Two popular varieties of barley are Black Skinless or Cape. The former is quicker growing, more palatable, and produces more feed as well as recovering better after grazing.

A fairly firm, fine under-tilth with a rubbly surface, similar to the seed-bed for grain crops, is required in the preparation of land for greenfeed cereals.

Barley may be grazed sooner than oats, but it goes off more quickly in the spring. Sown in March or April oats may be fed off in two to three months' time and grazed till September. Barley sown in March or April may be fed off early, but runs to stem quickly in the spring. In Southland oats as a cover crop for grass may be recommended, but in other districts it is not generally desirable when the main purpose is pasture establishment. Where greenfeed is the main object a bushel of oats sown with the grass is useful.

Preparation of land for greenfeed cereals is similar to that for grain crops; a fairly firm, fine under-tilth, with a rubbly surface is required.

Blue Lupins

During the last six years or so the popularity of blue lupins on light land both for soil improvement and for greenfeed has increased markedly. Blue lupins will thrive where brassicas may fail.

Important in the success or failure of the crop is the time of sowing, as time must be allowed for good establishment of the crops before the frost period. For spring feed in many districts sowing in March or April is successful. Blue lupins may be sown at 2 to 2½ bushels an acre, or they may be sown at 1 or 2 bushels an acre with oats or grass. The bitter blue lupin is essentially a maintenance crop, but the sweet blue lupin is more acceptable to stock and has been successful as a fattening crop. Both varieties of blue lupins require a seed-bed reasonably fine and firm beneath, but not too finely worked on top.

In determining what greenfeed is suitable the type of land, the time of sowing, the purpose of the feed, and the climate all require consideration. If sowing is likely to run into the frost period, blue lupins or temporary pasture are ruled out in favour of greenfeed cereals. Where frost is not a factor there is a wider choice. On light land where the building up of soil fertility is as important as the provision of greenfeed blue lupins may be preferred. Where a quick bite of feed is wanted with only a limited time for preparation, greenfeed oats or barley are better. If a longer period of supply is desired than is furnished either by lupins or greenfeed cereals, temporary pasture will prove most useful.

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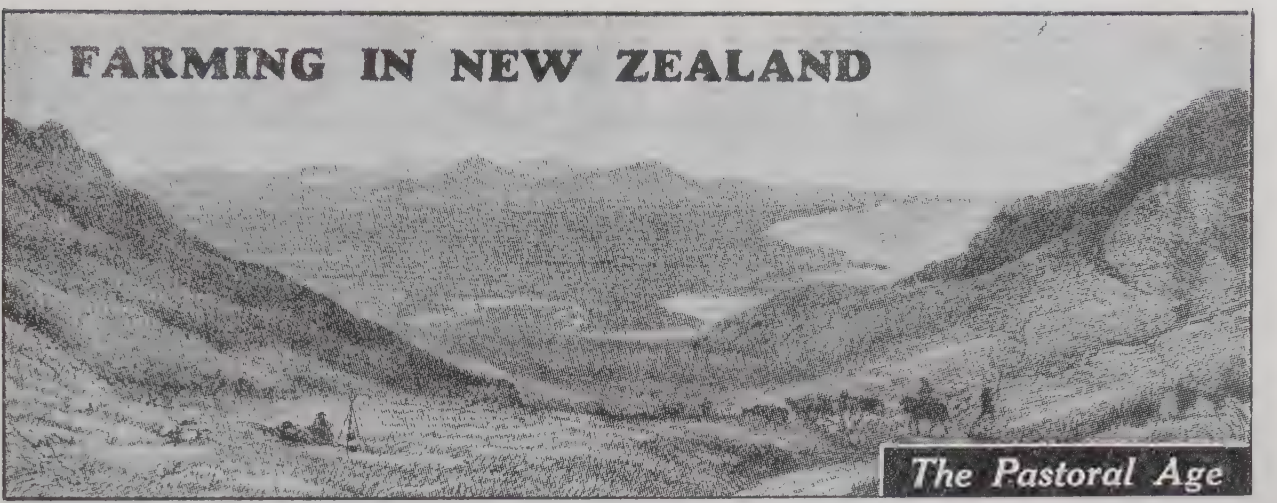
FARMING IN NEW ZEALAND



The Pastoral Age

HOW the pioneer settlers set about developing the wild lands of New Zealand was described in the article "Subsistence Farming" in this series, which appeared in the December, 1946, "Journal." It summarised the general farming progress of the country up to 1855. The pastoral age is dealt with in this article, which carries the country's general farming history up to 1880. It will be followed by an article on the "bonanza" cereal farms of the 70's and 80's.

By B. E. KING, *Rural Development Division, Christchurch.*

THE first settlers grappled with a new land, tested their farming preconceptions, attempted first to tame the vast forests of the North Island and almost reluctantly turned their attention to the native pastures of the South Island as a source of immediate income. By 1850 New Zealand farming had progressed beyond the pioneer subsistence ideal, and men with foresight and ambition, though often with limited capital, were beginning to lay the foundations of the pastoral industry on which the progress and prosperity of the country were to depend during the next half century and more.

The period 1853 to 1875 was in the main one of rising world prices and expanding trade. The development of railways, the steamship and heavy industry in Europe and the New World, the great gold discoveries of the period, the American Civil War and consequent inflation and extended use of bank credit all worked together to stimulate the volume of trade on terms favourable to producers of raw materials. Britain, committed to free trade, as the workshop of the world was absorbing increasing quantities of raw materials. Wool was the single great staple of manufacture that both Australia and New Zealand could supply, and wool accordingly became the basis of the economy of both countries.

The pastoral industry in New Zealand had its origin in Australia, where, at the time of New Zealand's colonisation, Merino sheep farming had developed into an important and profitable industry. John Macarthur was the figure of pre-eminence in the pastoral history of New South Wales and Australia. Though a lieutenant in the N.S.W. Corps, he combined the pursuit of farming with his military and civil duties. Macarthur experimented in wool growing, and in spite of much adverse criticism was successful in purchasing Merinos from the Cape of Good Hope. These sheep were progeny of a flock presented by the King of Spain to the King of Holland about the middle of the 18th century and shipped by the King of Holland to the Dutch in South Africa. Macarthur's first stud flock was small (3 rams and 5 ewes), but by wise breeding and judicious segregation from other sheep it was increased and its purity retained, and before long Macarthur's Spanish Merinos were in high demand all over Australia.

By about 1820 many young men had opened up sheep stations of vast extent in the Australian hinterland, taking up their holdings under annual pastoral licences. These "squatters" came from many walks of life. Some were ex-gentleman farmers from England or the sons of wealthy English families, while others were business or professional men who, having been unsuccessful in speculations or feeling the pressure of hard times in England, had decided to risk the remainder of their fortunes in the colonies. There were as well freed convicts from the penal settlement at Port Philip or soldiers or sailors who had decided to change their vocations.

Australian pastoralists were facing certain difficulties in the 40's with droughts taking toll of stock and crops, while banks everywhere were foreclosing on graziers who were unable to reduce their overdrafts. Many Australian squatters, therefore, ruined or discouraged by political troubles, financial debacles, and disastrous droughts, turned to New Zealand as their land of hope in the late 40's and early 50's. These men brought to New Zealand not only money and stock, but, what was more valuable, experience in extensive sheep farm management. They had unlimited faith in the squating system and great contempt for the freehold and small farm ideas in New Zealand.

First Sheep Farm in Wairarapa

Sheep were first successfully introduced into New Zealand by the missionaries, and the first sheep station to export wool was that established on Mana Island in 1834 by W. G. Bell. The flock on this station proved an attraction to the Maoris from the mainland, who frequently crossed from the Wellington coast to raid it.

Pastoral farming, however, made its first real start in the Wairarapa. Bringing with him 1600 Merinos from Australia in 1840, C. R. Bidwill sold 1250 of them in Nelson and took the balance to Wellington. The only access to the Wairarapa for sheep was along the beaches from Wellington, and this was the route followed by Bidwill, and by Clifford and Weld who followed closely. Wharekaka was the name given to the original station held by Clifford, Weld, Vavasour, and Petre in partnership. These four and Bidwill were the five men who pioneered the pastoral industry of New Zealand.

THE FIRST SHEEP FARMERS . . .

They were men of culture and education and they all attained public positions and recognition later. But they were primarily explorers, soldiers, and business men, and were not at first skilled sheep farmers. Bidwill had gone to Australia for two years on the advice of an elder brother who had preceded him to that colony, and he knew something of sheep management when he came to New Zealand.

The sheep of both Clifford and Weld were put to graze on marshy ground and, being Merinos, did badly. When John Scott Caverhill was given charge of the flock he advised shifting them to higher and drier country. Caverhill had gone to Australia from Scotland about 1830 and there gained high repute as a livestock breeder, judge, and drover. He came to New Zealand in the early 40's, and later it was his advice that caused Clifford and Weld to seek the higher and drier country of Marlborough for sheep farming. Caverhill pioneered Cheviot in North Canterbury, naming it Cheviot Hills. Subsequently he leased Motunau and owned Hawkeswood, Mendip Hills, and Highfield. Caverhill, like many another of the hardy pioneers who did so much to break in new country, died a poor man; his descendants, a road, and a trig station at Cheviot perpetuate his name.

Other settlers followed Bidwill, Clifford, and Weld, and sheep farming spread through Wairarapa into Hawke's Bay. Unable to buy land at that time, the settlers leased areas from the Maori owners, but the Government at last had to take action. Mr. McLean (afterwards Sir Donald McLean and Native Minister) negotiated with the Maoris and bought the Ahuriri block in December, 1850, and several blocks in the Wairarapa in September, 1853.

Grazing Lands

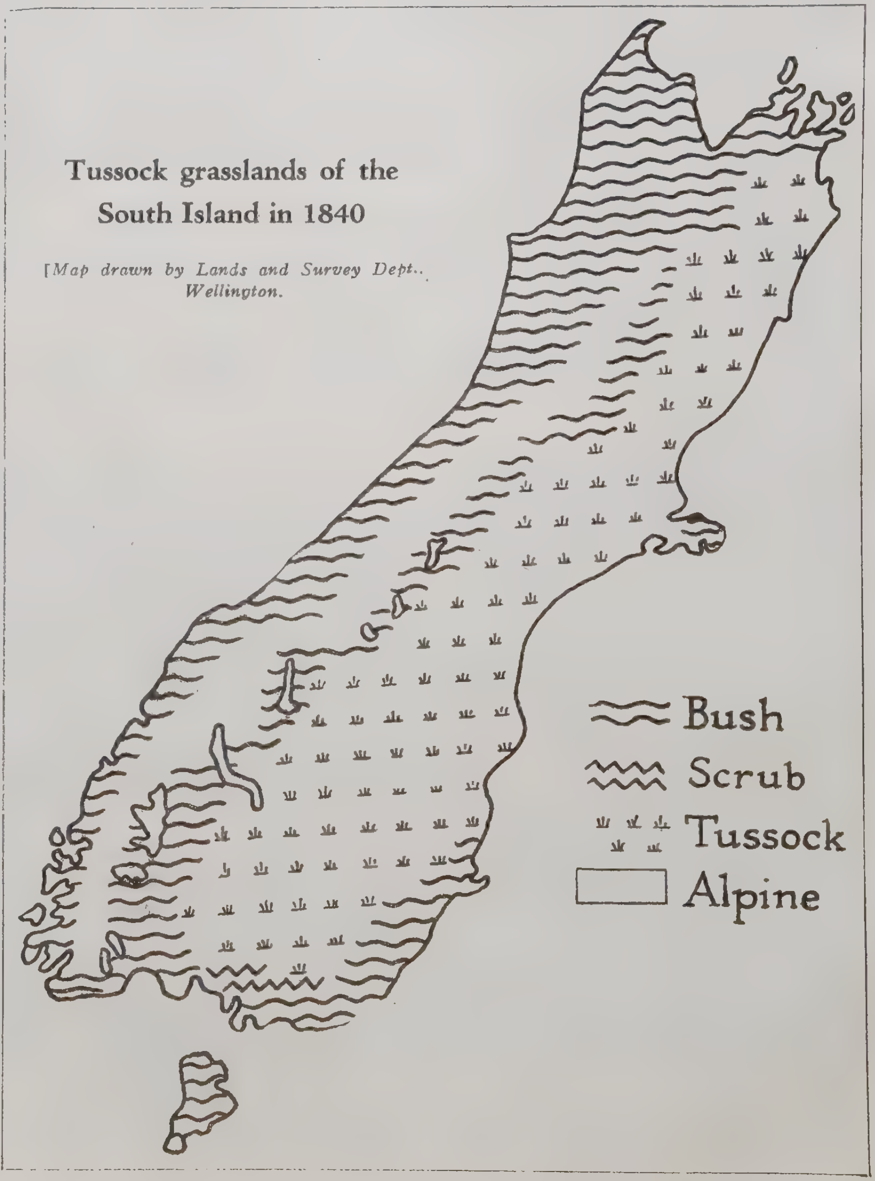
There was little or no natural pasture land in the Wairarapa or Hawke's Bay when the first sheep farmers came in with their Merino flocks from Australia. Some of the drier flats contained patches of tussock, but most of the land was clothed in heavy bush, scrub, and bracken fern. Fern and tutu hills were selected for pastoral activities; the fern was burnt off and at first the sheep had to subsist on what natural food they could find. Some surface sowing was done and by burning and grazing large areas of natural fern country were gradually converted into danthonia swards.

East of the main divide in the South Island, however, was a vast expanse of open tussock grassland which had developed in the absence of grazing animals, but with the exception of bluegrass none of the tussock was particularly palatable to sheep. Graziers soon found, however, that the young growth following burning was highly valuable sheep feed, and accordingly it became the practice to burn annually. After long years of indiscriminate burning, overstocking, and destruction caused by rabbits, the natural tussock grasslands of the country gradually deteriorated, and it is to introduced plants such as Yorkshire fog, catsear, and sorrel that the grasslands now owe much of their carrying capacity. The distribution of tussock lands in the South Island in 1840 is shown in the accompanying illustration.

These tussock grasslands of the South Island were much more attractive to the sheep farmer than any land he could obtain in the North Island, and it was therefore to the South Island that the extensive sheep farmers went.

George Duppa, the first recorded squatter in the Nelson settlement, was running 200 head of cattle and 700 sheep on previously-unoccupied land in the Wai-iti Valley in 1844; he later moved into the Wairau Valley in 1857, securing 8000 acres at 5s. an acre.

In 1846 Clifford (of the Clifford and Weld partnership in the Wairarapa) became interested in the pastoral lands of Marlborough and, following on exploration of the new country by Weld and himself, the partners took up a large area of open country on lease



Tussock grasslands of the South Island in 1840

[*Map drawn by Lands and Survey Dept., Wellington.*

[*Green and Hahn photo by courtesy of J. L. MacFarlane.*

Samuel Butler's old homestead on Mesopotamia Station on the Rangitata River.

in the Wairau Valley. The station they established was called Flaxbourne and later they took up Stonyhurst on the Canterbury - Marlborough boundary, stocking it with Merinos from Wharekaka. By 1850 they had 10,000 Merinos thriving on native tussock and were so well satisfied with the prospects of their new holdings that they sold their North Island interests and concentrated on Flaxbourne and Stonyhurst.

When Clifford and Weld took up their Marlborough estates surveyors were still mapping the country, and many impatient flock owners following in the footsteps of the partners were depasturing their flocks on waste lands in anticipation of a land ballot. Not until 1849, three years later, were any pastoral licences granted, and in the meantime a squatter held his selected run purely by occupation, having no vestige of legal title to it.

Pastoral Licences

For extensive sheep farming the pastoralist wanted the right of occupation of large areas of natural grassland. The only land he was keen to buy was that used for the homestead and other land necessary for the efficient stocking of the property, so that while he owned it the remainder of the property was valueless to anyone else. The answer to the position was found in the pastoral licence.

Crown Land Ordinances of 1849 and 1851 offered pastoral licences tenable for 14 years, if the land was not required for settlement or did not become included within the boundaries of any hundred. An annual licence fee, based on the stock-carrying capacity of the run, of £5 for the first 5000 sheep and £1 for every additional 1000 sheep and an annual assessment of 1d. a head of sheep and 6d. a head of cattle was all that was required from the first applicants. Runholders, who were officially limited to a run of 50,000 acres, were to be given every facility for buying a homestead area of 80 acres.

Sir Frederick Weld.

Canterbury

The aim of the original settlement plan for Canterbury was for a community of yeoman farmers, and although some pastoral activities were envisaged as necessary, the Wakefield plan of settlement stipulated that pastoral leases should be of short duration and pastoral lands open for free selection.

The Crown Land Ordinances of 1849 and 1851 granting pastoral licences attracted increasing numbers of pastoralists to Marlborough, and at length they pushed down into North Canterbury. Not long after the arrival of the first four ships of the Canterbury Association in 1850 recognition had to be given to the insistent claims of the pastoralists. In 1851 Robert Godley, resident agent of the Canterbury Association, threw open the Canterbury lands for selection for extensive grazing. The squatters came with a rush to select large areas of the particularly favoured and desirable plains of the south. They came from every walk of life—baronets, younger sons of good families, soldiers, sailors, parsons, lawyers, tradesmen, small farmers, and foreigners—and included in their number were many experienced Australian graziers. By 1855 almost all the plains were taken up under pastoral licence, while the Pilgrims of the

TRANSPORT

Isolation was one of the chief difficulties of the early pastoralists. There were no roads or tracks, and rivers were unbridged. At first all transport of wool and stores was done with bullock teams, but as tracks and roads were constructed horse transport became general.

original Canterbury Association remained on relatively small holdings near Christchurch.

Two men of Devon, Charles Tripp and John Acland, first broke new ground by venturing to take up a large block of high mountainous country. At first they merely acquired a reputation for harmless eccentricity, but within a very few years their example was followed with such eagerness that by 1860 the gorges had been penetrated and the country taken up to the very foot of the glaciers in the main chain of the Southern Alps.

Because of the accessibility of its vast plains. Canterbury rapidly forged ahead of the other provinces, and it was natural that many of the names best known in the lists of early New Zealand graziers were those of Canterbury squatters. There were L. MacFarlane of Loburn Station near Rangiora; the Rhodes family at Purau, Banks Peninsula, and Levels near Timaru; Tripp and Acland, who have already been mentioned; the Rutherfords of North Canterbury; Samuel Butler, author and sheep farmer, of Mesopotamia Station, on the Rangitata River; but perhaps best known of all were the Studholme brothers at Waimate.

Acland, in his book "Early Canterbury Runs," says that the story of the Studholmes at Waimate Station is the history of squatting in Canterbury. It is noteworthy that Michael Studholme on his arrival at Waimate first made a pact with the Maori chief, which was honoured by both parties, so that the Maori and the squatter in Canterbury lived side by side in peace.

These men were all interested in better-class sheep, and almost without exception they employed Scotch shepherds as managers and readily accepted their advice as to the most suitable breeds of sheep. MacFarlane, for instance, found that his flock of imported Scottish sheep did not do nearly as well under harsh winter conditions as his flock of Australian Merinos. He accordingly became a Merino advocate and later imported the best of this breed obtainable.

Under the good conditions obtaining in this province the size of flocks rapidly increased, so that by 1870 Canterbury was considered to be fully stocked with sheep.

Otago and Southland

Sheep farmers invaded the sunny unoccupied tussock plains of Otago in 1857. Dunedin was barely 10 years old and few roads had been constructed in the province. Central Otago was explored by such men as Captain Fraser, the McKellar brothers, Watson, Shennan, John McLean, Edmund Bowler, and John Cargill, who, having penetrated the wilds and made their selections, followed up by leasing them as sheep runs from the Provincial Government.

[*Green and Hahn photo by courtesy of T. F. Northcote.*

Skinning sheep smothered in the great snowstorm of the 60's at Highfield, North Canterbury.

One of the great difficulties the early settlers had to contend with was the Clutha (Molyneux) River. Terrible hardships and ruinous losses were suffered by many of the early squatters in getting their sheep and themselves across the river.

The hinterland of Otago was early recognised as eminently suitable for Merinos. W. G. Reeves and Von Tunzelman were the two earliest squatters on the shores of Lake Wakatipu, Reeves's station including within its boundaries the land where Queenstown now stands. The discovery of gold in Otago in 1861 had a tremendous effect in the opening up and exploring of much unknown country, but the gold seekers had to thank the runholders for what roads and tracks there were. The squatters in turn received high prices for their mutton which went to feed the hungry hordes on the goldfields.

Southland and Otago were united as one province during the 50's and the settlement of Southland was an integral part of the history of the settlement of Otago. W. B. Mantell (later Native Minister and M.L.C.) was responsible for purchasing Southland from the Maoris, and when this was completed many of the sealers and whalers along the southern coastline turned pastoralists and selected runs under pastoral licence. The first immigrant runholder, named Mieville, took up Glenham for himself and Oaklands for Dr. Richardson. Two years later all the accessible interior was taken up and stock was arriving from Australia at the Bluff. Much of the Southland plain was held at first under pastoral licences, but soon it had to be given up to small farmers, the licence holders seeking new country in the more remote interior. The McKellars on the Waimea Plains, with Glenure and Ben Callum stations, were among the earliest squatters in Southland.

Otago and Southland, more perhaps than Canterbury, have Australian graziers to thank for their first settlement. Syndicates and land companies of Australian origin were common during the 50's and 60's and indeed not a little advertising and propaganda was put out by the provincial councils to interest Australian graziers in the southern provinces. The largest of these companies was the New Zealand and Australian Land Company, later responsible for starting the frozen meat and the dairy export industries.

Merinos were found unsuitable for the wet land of the Southland and Otago plains, although they were very suitable for the high country of both provinces. Lincolns, English and Border Leicesters, and Romneys were introduced to the heavy land, and possession of these sheep in large flocks and of excellent breeding gave Southland and Otago a marked lead when the frozen meat industry was established in 1882.

Some idea of the extremely rapid development of the pastoral industry in these two provinces can be gained

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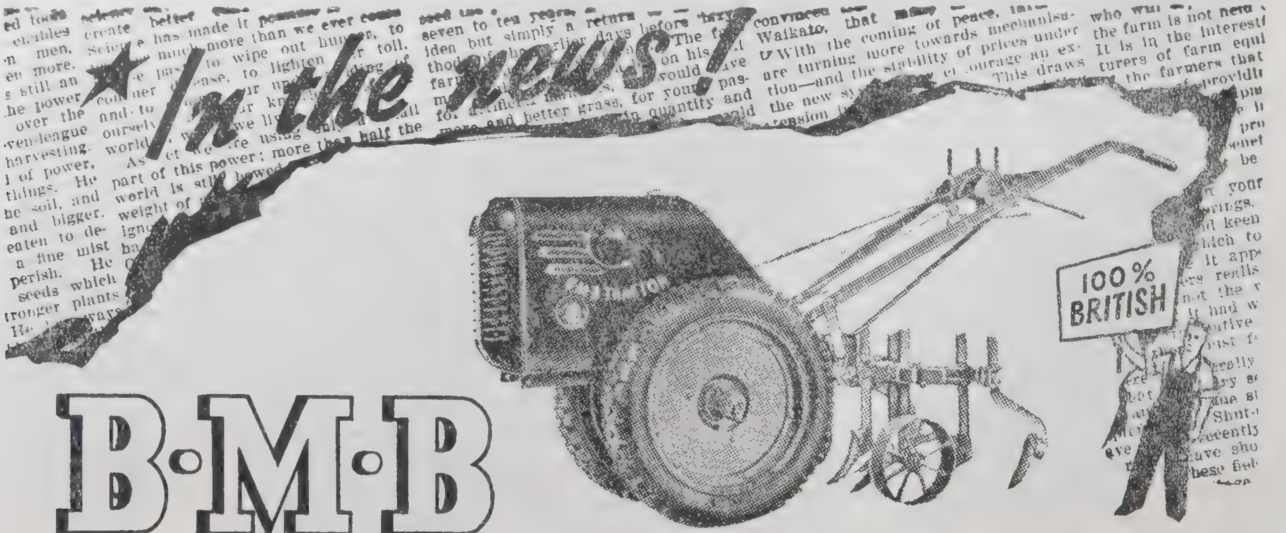
Photographs on opposite page by Green and Hahn by courtesy of D. L. Rutherford.



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from the fact that in 1855 the combined total of sheep held in Otago and Southland was 75,500, while six years later (1861) the combined total was 693,900. Canterbury, with 877,400, was the only province with a larger flock.

Early Sheep Farm Management

In the early days of extensive pastoral farming the squatter had to establish himself in the wilderness without any of the modern conveniences of transport. In the days when Tripp and Acland first set out to look for unoccupied land in the back country of Canterbury the plains were a limitless stretch of brown tussock with no landmarks between the mountains and the sea. There were no plantations, fences, or water races. In the whole province only 12,260 acres were fenced and only 6460 acres were under crops of any kind, and most of this area was close to Christchurch.

The following is an adaptation of extracts from Mr. J. Andersen's "Jubilee History of South Canterbury":—

> "Discovering suitable sheep country was one thing, but getting sheep on to it was quite another. The crossing of great rivers always gave much trouble, especially in Canterbury, Otago, and Southland. Even with sheep on the selected country, there was still much to do. Overgrowth of fern and scrub made burning off imperative, but the burning of one year was by no means sufficient in all cases to clear the ground of all the rough growth whose presence was a serious obstacle to successful occupation. Since burning brought improvement at first, it was too frequently resorted to in subsequent years and was carried out without discretion as to place or season, so that many thousands of acres of excellent country have been ruined by indiscriminate use of fire."

Mr. J. Acland in his "Early Canterbury Runs" adds to this:

> "Having burned off his run or not as he deemed necessary, the squatter then brought on his sheep, usually 1000 to 1500 ewes. He also brought a horse or two and a bullock dray loaded with stores and tools. He brought what men he could afford to employ—perhaps a shepherd and bullock driver and a couple of extra hands for bush work and fencing. As a special luxury he sometimes brought a cook who was called a hut-keeper, but who also had to join in the general work.
>
> "The squatter chose a place for his homestead, pitched a tent, built a temporary scrub yard to hold the sheep at night until they were used to the country, left the shepherd to look after them by day, and started off with the dray and the other men to the nearest bush for timber for a hut and fencing. The fencing at first meant only a simple sheep yard and a paddock to hold the horses and bullocks."

[Green and Hahn photo by courtesy of D. L. Rutherford.

Scoured wool being dried before shipment to England, a practice which continued until the late 80's.

Until scab broke out no dipping was done, and runholders tried to breed up their flocks in numbers as rapidly as possible; until 1865, when most of the runs were at last fully stocked, there was always a good market for store sheep.

Sheep were scarce during the late 50's and early 60's and in Canterbury a scheme was devised by which a man with sheep but no land could let them out on terms to a man having land but no sheep. The ruling price for four-year-old ewes was high (about 30s. a head) and most of the stations were no more than half stocked. The system was for the owner of the sheep to hand them over to the runholder, who allowed him 2/6 a head a year for the wool and in addition marked 40 per cent. of the lambs (half ewes and half wethers) for the owner. Sometimes the lambs were halved between them. The period of agreement was usually three to five years, and during that time the owner of the sheep had a steady income, with an increased flock to repossess, while the runholder had increased his flock without the expense of buying ewes at high prices.

Equipment on the early sheep stations was quite primitive, and conveniences such as wool sheds and drafting yards came in only slowly. Wool sheds at first were merely stores for wool and it was some time before the idea developed of having a shed full of sheep waiting overnight for the next day's shearing. The slatted floor of the modern wool shed was first used about 1857 on George Duppa's St. Leonards Station, North Canterbury.

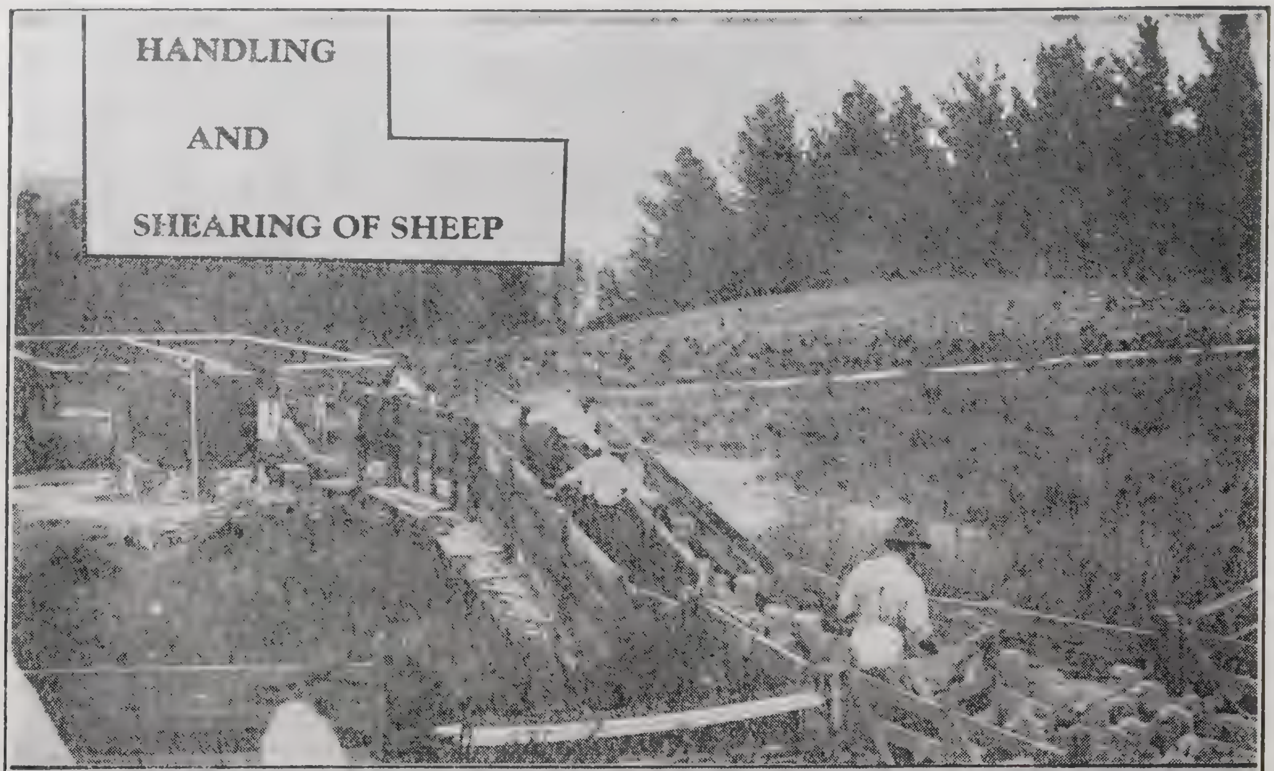
Drafting gates were not in favour at first, and tens of thousands of sheep were drafted by lifting each sheep over the fence. Squatters thought that sheep were damaged more often with gate drafting, and many of them also considered that a man who would not hand draft was altogether too lazy to be of any use!

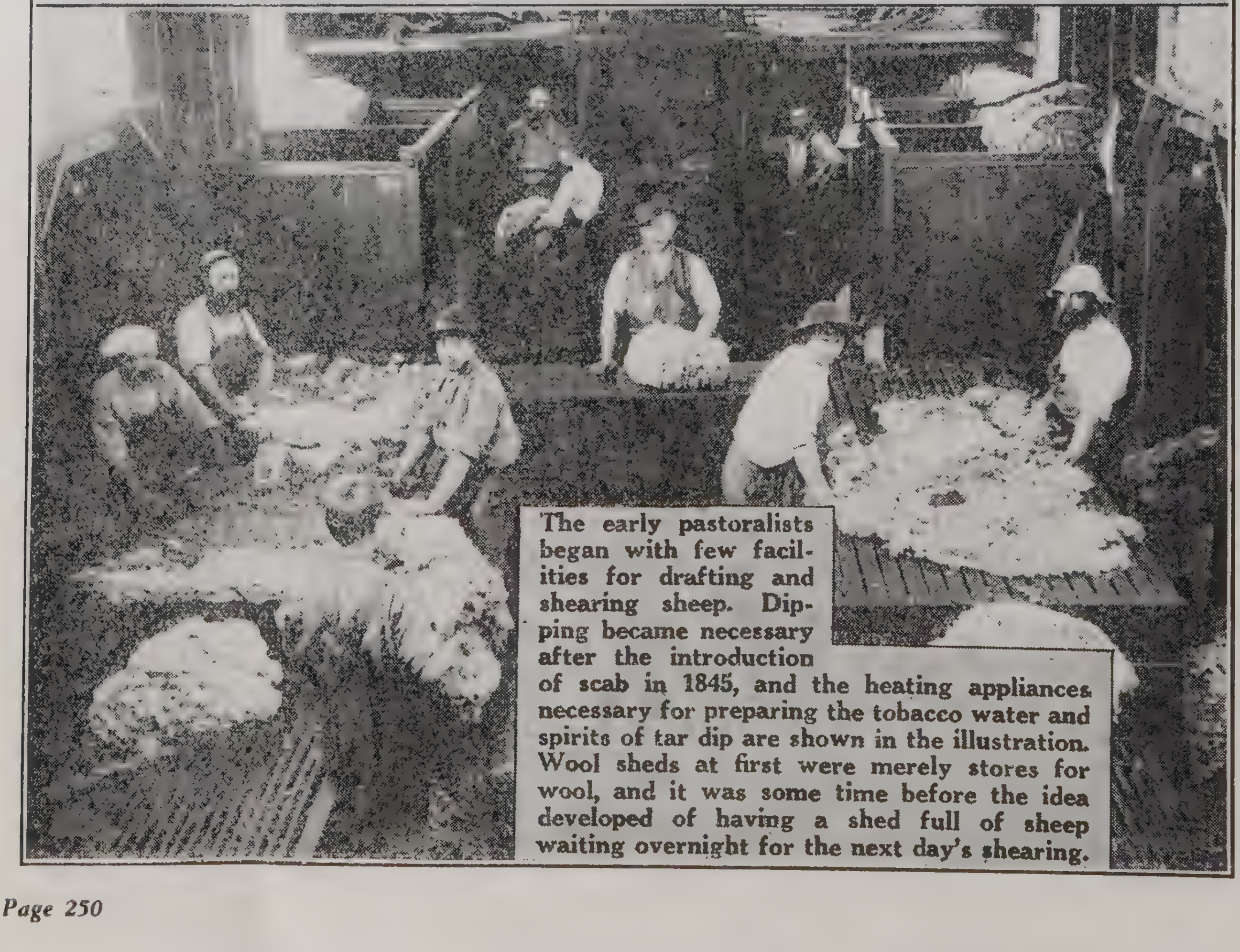
Fencing was a problem in the early days. Before the runs were fenced rivers, creeks, snowlines, and other natural features were used as boundaries. Shepherds living in lonely huts, each responsible for his own section of boundary, kept the stock from straying off their owner's block. Samuel Butler recommended that if sheep always had peace on their own run and none anywhere off it, they would soon learn where the boundaries were. But when the country was swept by a south-west gale the Merinos simply ran before it, even deserting their lambs.

Fencing was largely dispensed with until the middle 60's, when wire began to be used. The first wire was almost half an inch thick and could not possibly be strained or knotted. Its great weight made its use impracticable in the high country, to which fencing materials, even today, have to be packed on a man's back. A later development was the black (ungalvanised) wire of much smaller diameter, which proved a popular wire with runholders. Many of the sheep stations of the present day are still bounded with black wire fences erected in the 1860's. Later the Australian development of a galvanised wire decided the argument in favour of wire fences. Staples were not used at first, coming somewhat later, and the posts of the original fences were drilled to take the wires.

In 1851 Weld published a pamphlet entitled "Hints to Intending Sheep-

HANDLING AND SHEARING OF SHEEP





The early pastoralists began with few facilities for drafting and shearing sheep. Dipping became necessary after the introduction of scab in 1845, and the heating appliances necessary for preparing the tobacco water and spirits of tar dip are shown in the illustration. Wool sheds at first were merely stores for wool, and it was some time before the idea developed of having a shed full of sheep waiting overnight for the next day's shearing.

farmers in New Zealand." The chief point of interest in the pamphlet was Weld's rigid belief that the Merino was the best possible sheep for New Zealand conditions, and in 1860, when he reprinted the pamphlet in book form, he still upheld the pure Merino against crossing it with the heavier breeds of long-woolled sheep, as most of his contemporaries were doing. Weld still clung to autumn lambing in 1860, but with the introduction of wire fences, ewes and rams could be kept separate and uniform spring lambing became the accepted practice.

Fencing on the plains of Canterbury and Marlborough was delayed until the introduction of water races, which provided a dependable summer water supply for stock. These races were the outcome of experiments carried out by Duncan Cameron of Methven, who excavated the first water races in the early 70's.

Scab

The scourge to early sheep farmers was scab in their flocks. Scab made its first appearance in Nelson in 1845, spreading rapidly to Canterbury and Otago, and the Wairarapa became affected in the following year. The spread of the disease was almost inevitable under the conditions. Sheep were constantly shifted about the country, being driven through unfenced runs, and a travelling flock carried or received infection wherever it went. Thus it was a decided advantage to have an "out-back" run, as it was less likely to be exposed to infection.

Regulations were enforced making it compulsory to give advance notice of intention to drive sheep through occupied country so that the occupier would have time to clear his sheep from the route.

Scab was treated by dipping the sheep in a mixture of tobacco water and spirits of tar. The tobacco required for the process was, wherever possible, grown by the station owner himself to reduce the cost of treatment. Individual sheep suffering from the disease were branded with a large "S" and carefully treated, the spots being thoroughly scarified and then rubbed with spirits of tar. As the witches' potion of tobacco and tar had to be heated, considerable hauling of wood was entailed preparatory to dipping. Scab was not thoroughly checked until late in the century, by which time the greater part of the country was fenced and sheep could be properly isolated. Canterbury was declared free from the disease in 1884, but it was 1892 before New Zealand as a whole was considered free.

Rabbits

Rabbits are said to have been first released at Invercargill in 1864 and were treated as pets by explorers and prospectors, who carried them on their journeys, liberating a pair here and a pair there. Southland and Otago were swarming with the pest within 12 years of their liberation. Wherever the rabbits went they left the ground bare. No other animal cropped the grass more closely than they did, so that they existed where all else starved. Lambing percentages in parts of Southland and Otago fell from 70 per cent. to 20 per cent., and the wool yield from the Southland Province suffered a severe reduction. Rabbits swept up the South Island from Otago and Southland, leaving a train of ruined high-country squatters behind them. On the plains and more accessible country the pest was at least controllable and the damage it could do was somewhat restricted.

Various "Rabbit Nuisance" Acts were passed and the Government was asked to promote the manufacture or import of phosphorus for poisoning. Natural enemies of the rabbit such as ferrets and weasels were also imported and liberated to combat the pest. In spite of all the measures taken for control and eradication of the pest, exports of rabbit skins from 1873 to 1877 rose from 33,000 to 1,000,000 skins and in 1882 to 9,000,000 skins. It was not until the 1890's that control measures were deemed effective enough for it to be said that rabbits would never again become a national menace.

Changes in Sheep Breeding

Although Merinos were the dominant breed of sheep up to the 60's, English breeds were brought in during the 50's and 60's. According to Sir William Perry in his book "Sheep Breeding in New Zealand" English Leicesters were imported from England by Every McLean of Auckland in 1853, and during the 60's were introduced into Canterbury by P. C. Threlkeld of Flaxton Station. Border Leicesters were first imported into Otago by the New Zealand and Australian Land Company and George Murray, of Taieri, in 1859. A Mr. Ludlam brought Romney Marsh sheep to Wellington in 1853. Lincolns came in the late 50's, being another importation by Every McLean. A Mr. Hunter of Wellington was also among the first importers of this breed. Southdowns were introduced in 1863, but were not much used except for local mutton supplies.

Some mixture of long wools with the Merinos took place at an early date, as the crossbreds produced a heavier fleece and were less nervous than the pure Merino. The same tendency to adaptation that produced the crossbred led to the development of the Corriedale. This in-bred half-bred sheep was specially designed to stock the intermediate hill country, and the breed takes its name from the property in North Otago on which James Little in 1866 first crossed Romney Marsh rams with Merino ewes. The original flock was dispersed, but Little recommenced his experiments in 1878 at Annandale, North Canterbury, substituting Lincolns and then English Leicesters for the Romneys he had first used with Merino ewes at Corriedale. Other breeders developed the same idea, although it was not until the coming of refrigeration in 1882 that the advantages of the breed for mutton production were fully realised.

Even so the half-breds and Corriedales exhibited too many of the weaknesses of the fine-woolled sheep in that they invariably became a prey to footrot on the heavier lands of the North Island and in Otago and Southland. In the North Island the Romney-Lincoln cross was found most suitable for land on which bush had been felled, and in Southland Border Leicesters were favoured. Subsequently both areas have concentrated on Romneys.

General Farming Development

From 1855 to 1881 the number of sheep in New Zealand increased from three-quarters of a million to 13 million and the balance of population moved from the North Island to the South. Table I shows the increases in sheep population on a provincial basis.

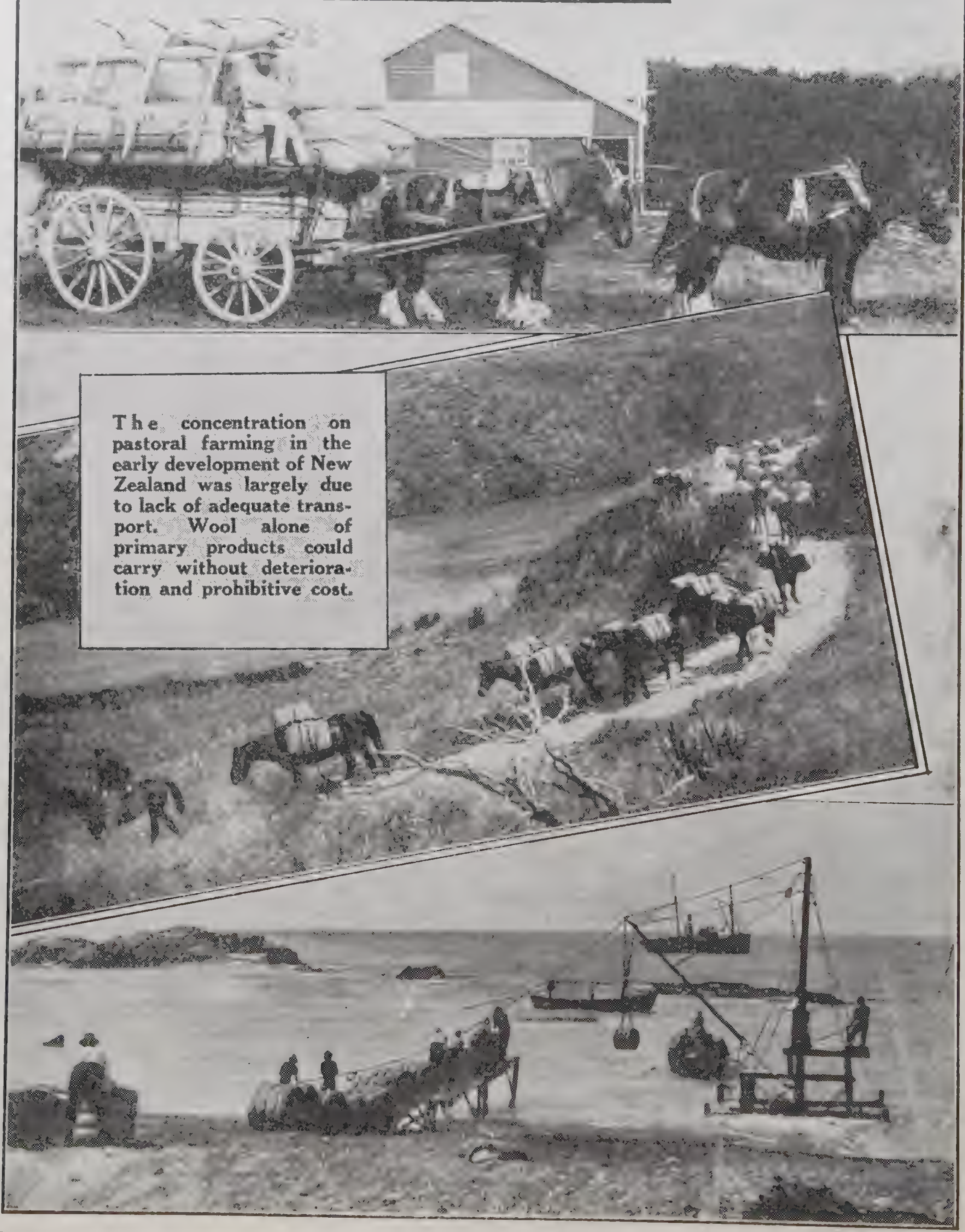
Auckland had no wide expanses of open tussock grassland suitable for sheep farming to offer settlers. Settle-

TABLE I.—Sheep Numbers on a Provincial Basis

	1855.	1861.	1871.	1881.
Auckland	22,000	67,800	210,800	535,000
Taranaki	14,800	10,600	24,300	69,400
Wellington	193,700	247,900	714,100	1,903,400
Hawke's Bay		312,500	904,400	1,547,200
Nelson	235,000	181,400	523,600	631,300
Marlborough		368,800	604,800	760,800
Canterbury	220,700	877,400	2,965,700	3,519,400
Westland			4,600	4,400
Otago	75,500	619,900	2,893,800	3,952,000
Southland		74,000	837,600	
	761,700	2,760,300	9,683,700	12,922,900

Photographs on opposite page by Green & Hahn by courtesy of D. L. Rutherford.

TRANSPORT



The concentration on pastoral farming in the early development of New Zealand was largely due to lack of adequate transport. Wool alone of primary products could carry without deterioration and prohibitive cost.

ment was at first confined to North Auckland and the land south of Auckland to the Waikato Heads. The great lower and middle basins of the Waikato were held by the Maoris, who were averse to selling, and while the southern provinces were attracting sheep farmers, Auckland and Taranaki were offering 40-acre bush sections to immigrants. The Maori Wars of 1860-1872 also discouraged northern settlement. Although the wars of the Waikato and Taranaki were ended in 1865 and 1866, isolated clashes and raids continued throughout the centre of the North Island and more particularly in and adjacent to the King and Urewera Country until 1872. The generally-unsettled state of the North Island during the whole decade 1861 to 1870 resulted in a diversion of prospective settlers to the South Island, where land was open, easily obtainable, and where life promised to be safer. A further impetus to the population increase in the South Island was given by the discovery of gold in Otago in 1861. The influence of these factors on the distribution of the European population is shown in Table II.

Photographs on opposite page by Green & Hahn; those of the Canterbury "prairie schooner" and of the loading of wool into surfboats by courtesy of D. L. Rutherford.

The European population was divided between the South and North Islands in the proportion of almost 2 to 1 from 1864 until after 1881, hence the more rapid development of roads, railways, and towns in the South to that date.

In Wellington extensive sheep farming swept up the east coast, first on the bracken-covered hills and tussock and scrub flats, and later on the bush clearings. In Nelson, Marlborough, Canterbury, Otago, and Southland the squatters rapidly occupied all available tussock grassland.

By the end of the 60's the areas easily converted into sheep farms were being fairly fully used, and after 1864 the price of sheep began to decline steadily until in 1870 good ewes, instead of being worth 30s. a head, were worth only 5s. The figures in Table III are a comparison of the prices for breeding ewes over the 1855 to 1880 period.

The local market for meat was very restricted and soon over-supplied. Attempts were made to export meat to England by a variety of methods. Canning was tried, also packing in casks of tallow, but the quantity that could be treated in this manner and still command a market in England was still far below the requirements of the sheep industry. Meat-preserving works were started at Woodlands, Oamaru, and Timaru, and later rabbits were canned for export at Winton and Woodlands, but the general practice was simply the boiling down of surplus stock for tallow. Wool, hides, and tallow became the chief revenue-producing lines of the sheep industry. Stories are told of surplus sheep during the early 70's being driven over cliffs into the sea because of lack of facilities for canning, preserving, or boiling down. The low prices being paid for sheep were bound to benefit someone, and in this case it was the North Island runholder. The low prices enabled him to buy huge mobs of sheep with which to trample second-growth vegetation and greatly assist in grassing many thousands of acres in the Hawke's Bay and Gisborne districts, where until then fern and scrub had been the only natural vegetation.

The expanding population in the 60's following the gold discoveries in both islands created a very good market for agricultural produce and led to the development of large-scale cereal production. The total acreages in New Zealand between 1856 and 1880 for wheat, oats, and barley are given in Table IV.

TABLE II.—European Population (Thousands)

		North Island.	South Island.	Percentages North Island.	Percentages South Island.
1858		34	25	58	42
1861	Maori War period	42	57	42	58
1864	Maori War period	65	107	38	62
1867	Maori War period	80	139	36	64
1871	Maori War period	97	159	38	62
1874		112	188	37	63
1878		162	262	38	62
1881		193	297	38	62

TABLE III.—Prices of Breeding Ewes 1855-1880

Province.	1855.	1861.	1865.	1870.	1875.	1880.
Auckland	22/6d.	20/-	—	9/6d.	17/-	11/-
Taranaki	35/-	20/-	35/-	11/-	13/-	16/-
Wellington	35/-	20/-	20/-	5/-	14/-	
Hawke's Bay		19/-	15/-	5/-	11/6d.	8/6d.
Nelson	23/-	20/-	15/-	8/-	12/-	12/-
Marlborough		20/-	16/-	6/-	6/-	10/-
Canterbury	27/6d.	30/6d.	22/6d.	7/6d.	5/6d.	8/6d.
Otago	31/6d.	27/-	22/-	5/-	—	9/-
Southland		25/-	20/-	5/-	11/-	—

TABLE IV.—Cereals (to nearest 100 acres)

Year.	Wheat.	Oats.	Barley.	Total.
1856	12,800	5,000	1,700	19,500
1861	29,500	15,900	3,500	48,900
1864	25,600	51,000	4,900	81,500
1870	86,200	99,500	28,600	214,300
1875	105,700	157,500	16,200	279,400
1880	270,200	330,200	57,500	657,900

The most rapid rise took place after 1878 when the boom conditions of the 70's ended and extensive cereal production became more profitable than extensive sheep farming on the tussock lands of the plains. The invention of drills and reapers and binders came at a most opportune time, enabling a rapid change-over from wool to cereal production to be made on suitable country, notably in Canterbury.

The development of sown grass progressed fairly rapidly right through the period, land being sown both after ploughing and after burning of the natural vegetation. Better grass seed mixtures were also used, and in particular more clover was sown. Table V shows the extent to which the area sown in grass increased between 1855 and 1880.

Progress in all districts became more rapid after the 70's because of roads and railways constructed under Sir Julius Vogel's public works plan. The rapid growth of the railway system, although subject to bitter controversy in view of the huge sums borrowed for its construction, is evident in that the length of completed line increased from 145 miles in 1873 to 1288 miles in 1880. During the same period the mileage of telegraph lines increased from 2400 to 3800 miles. The maps on pages 254 and 255 show the length of railway line completed and that under construction in 1875.

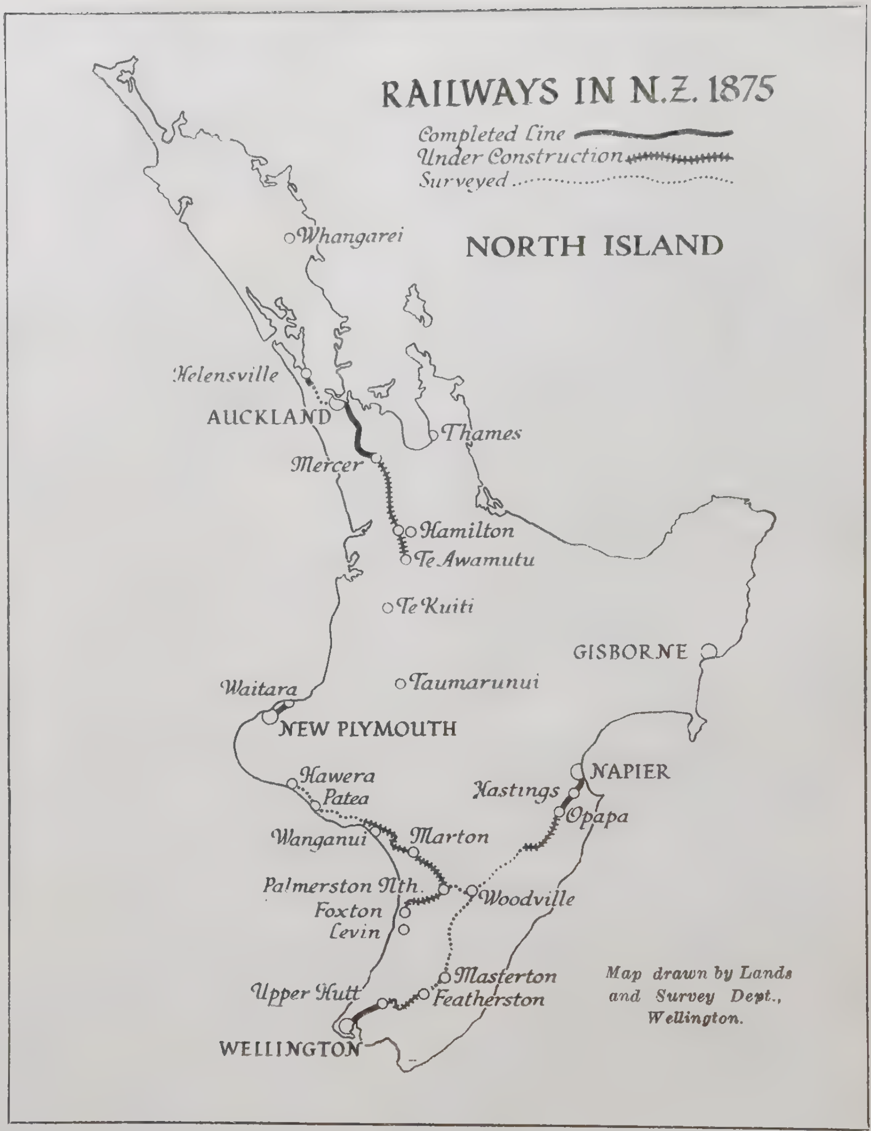
An estimate of the progress of the period may be drawn from the figures for the principal exports given in Table VI.

Until 1875 wool and gold accounted for up to 80 per cent. of the total exports, but after that date output of the goldfields began to diminish and wool declined in price. The fact that exports of grain and timber rise after 1875 and preserved meat appears as an increasingly important item indicates that farmers quickly took advantage of additional sources of income.

Summary of Period 1855-80

The attention of settlers in this period was devoted to the expansion of the pastoral industry with its products of wool, hides, and tallow. Wool exports rose from 2,500,000lb. valued at £146,000 in 1856 to nearly 67,000,000lb. valued at over £3,000,000 in 1880. These totals represented in both years half of the total value of exports.

FARMING DEVELOPS . . .



The concentration on pastoral farming was dictated on the production side by lack of the capital development and labour force required by more intensive types of farming and on the marketing side by the distance from markets of the Old World and lack of efficient internal transport. Wool alone of primary products could be carried without deterioration and prohibitive cost. In addition, in problems of pastoral management, Australian experience proved very useful, even if it was necessary to adopt other sheep breeds suitable to New Zealand conditions. The Merino had only a limited local usefulness.

Because of the large areas of open tussock country and with the Maoris holding up settlement in the North Island, settlers soon turned their attention southward from the original settlement at Wellington. The extensive settlement that followed the infiltration of squatters into Marlborough, Canterbury, Otago, and Southland called for a tenure other than freehold, especially if there were to be adherence to Wakefield's original plan of a "sufficient" price for land. The Government, not wishing to tie up "waste" lands permanently in large holdings but at the same time recognising the rapidly expanding claims of the squatters, introduced the pastoral licence. The rental was low, the holding large. On this tenure great areas were pioneered. At the peak of its popularity in 1872 15,000,000 acres were held under pastoral licence.

But many difficulties, inherent in opening up a new country, had to be met and overcome. In addition to scab and lack of fencing and buildings, sheep were scarce in the early years of settlement. Stocking of runs began slowly, though it soon gained in momentum. Sheep numbers, which had not reached 1,000,000 in 1856, had risen to nearly 1,500,000 by 1858 and nearly doubled from 1858 to 1861. The same ratio of increase was maintained between 1861 and 1864 and between 1864 and 1867. While this rate of increase was maintained all was well. But, while sheep numbers had risen from 4,900,000 in 1864 to 8,400,000 in 1867, from 1867 to 1870 they increased only to 9,700,000. Runs were becoming fully stocked on the standards of the extensive pastoral runs then existing. An industry geared to a 100 per cent. increase every three years was bound to strike trouble when the rate of increase fell much below this, even if world prices of livestock products had been maintained. Consequently, in the face of the competition of the runholders to clear an excess of stock, prices sank very low in the late sixties. Unfortunately the position was aggravated by a sharp though temporary recession in the prices of pastoral products.

TABLE V.—Total Area Sown in Grass (to nearest 100 acres)

Province.	1855.	1861.	1870.	1875.	1880.
Auckland	19,600	62,800	133,000	256,900	504,600
Taranaki	6,100	9,600	22,400	54,900	111,200
Wellington	7,900	49,100	176,600	295,200	776,700
Hawke's Bay		3,700	48,900	201,500	604,300
Nelson	4,300	12,200	34,700	49,800	98,300
Marlborough		1,800	16,900	29,700	52,900
Canterbury	800	10,300	102,400	302,900	715,100
Otago and Southland	1,300	9,000	113,900	244,500	469,200
TOTALS	40,000	158,500	648,800	1,435,400	3,332,300

TABLE VI.—Exports of New Zealand in £'s (nearest 100)

Year.	Wool.	Grain, Bran, Flour.	Gold.	Timber, Oil, Gum.	Pres. Meat.
1855	146,100	28,152	—	52,100	—
1860	444,400	14,400	17,600	28,500	—
1870	1,704,000	152,800	2,163,900	284,600	47
1875	3,398,200	238,800	1,407,800	185,600	7,189
1880	3,169,300	928,600	1,228,300	299,800	28,563

Low South Island prices for stock, while they reacted to the advantage of those North Island farmers who were sufficiently fortunate to obtain land, at the same time encouraged South Island farmers to turn to bonanza cereal farming. Another development which encouraged arable farming was the favourable local market created by the gold discoveries. Wool and gold exports together made possible the importation of capital goods used in land

. . . BENEFITS OF CENTRALISED GOVERNMENT

development, pasture improvement, and farm buildings. Their growth encouraged overseas borrowing for the development of internal transport and for the introduction of immigrants. The public debt rose from less than £8,000,000 in 1870 to £28,500,000 in 1880, and the population from 284,000 to 485,000.

The policies of borrowing and immigration, the improvement in transport facilities, a recovery in export prices, the low stock prices, and the competition for land as a result of the growth of cereal farming produced a land boom. In this boom, from 1872 to 1878, great areas of land became freehold and the area on pastoral licence fell. In the efforts of the pastoralist to retain and of the speculator and small farmer to obtain land, properties became heavily mortgaged. Though world prices had already begun to fall about 1875, the mortgage debt continued to increase. Between 1873 and 1878 £27,000,000 of total mortgage debt was registered, which was over three times the total of mortgages discharged.

By 1878 it had become obvious that the land prices and structure of debt then ruling could not be maintained. Gold production was declining and world prices were falling. The land boom faltered in 1878. Public expenditure eased off two years later. Many of the large runholders were left in an unenviable situation. Saddled with a heavy load of debt, in some cases an impossible load, they had also to contend with low stock prices, scab, and the rabbit pest. Large areas passed into the hands of banks and other mortgagors.

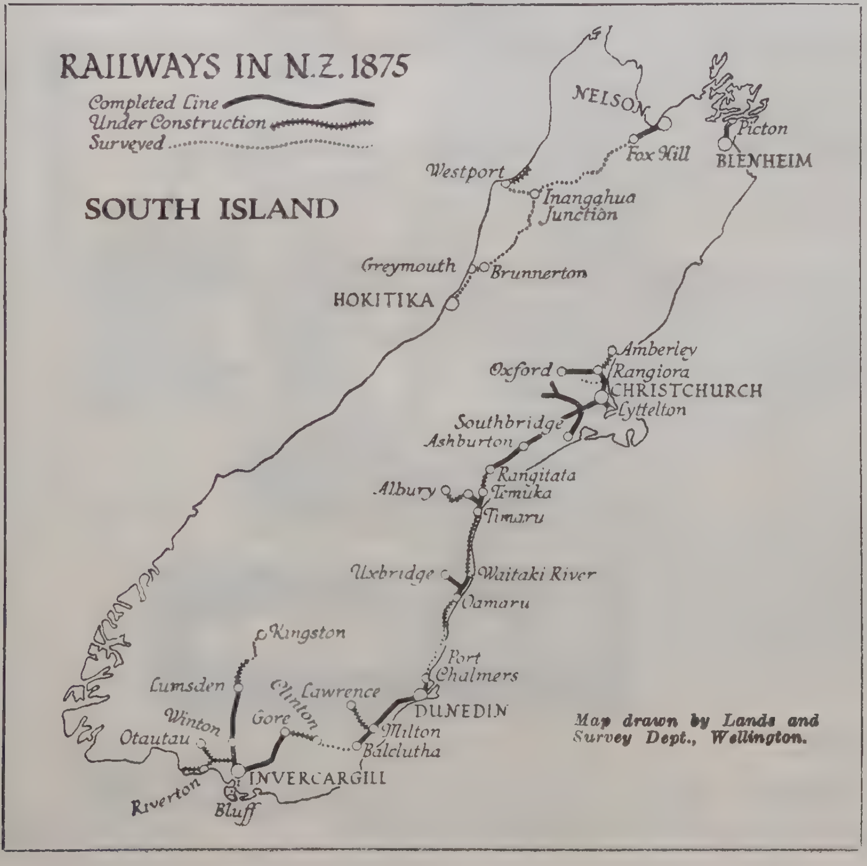
Apart from its connection with the land boom and besides reducing the margin between prices at the farm gate and at the market, the improvement in communications—roads, railways, and the telegraph—made possible centralised government. With the development of colonisation the number of provinces had increased from the original two in 1848 to ten in 1867. The reason for the early importance of the local Provincial Councils, which were involved in maintenance of harbours, hospitals, asylums, charitable aid, police, and public works construction and maintenance, lay in the isolation of the various settlements. Roads were at first only local feeder roads and more extensive transport and communication had to follow sea routes. The linking up of roads and railways in the 70's, however, and the introduction of the telegraph and the increasing efficiency of shipping communication rapidly broke this isolation. It became possible to achieve the benefits of centralised Government.

Not the least of these benefits was the gradual simplification of the maze of provincial land laws, in which both wary and unwary equally became lost. The chaotic state of the land laws was due in no small measure to the progressive attempts of provinces—less favourably situated than their rivals to attract immigrants by the offer of waste lands on more favourable terms. One motive was to raise funds for public works development which would react to the benefit of the settlers already there. However, by the legislation of 1876 this state of affairs was ended. The General Assembly took over the sale of waste lands, a step involving an important consolidation of revenue, and assumed responsibility for education, police, roads, railways, defence, and Native affairs. The provincial councils were abolished and local government placed in the hands of county and borough councils.

Overshadowing all the great changes during the period 1855–80 was the rise in the value of wool and gold exports, and at the same time grain became another important item. Further, the economic centre of the country had shifted from north to south. This is illustrated by the distribution of exports from the four main centres in 1876:

	Value of Exports. £
Christchurch	**1,727,107**
Dunedin	**1,495,772**
Wellington	**694,333**
Auckland	**583,766**

Speculation in land had resulted in a crash. But if the period ended on a note of disillusionment, the rise in value of exports had permitted the laying of the foundation on which the later development of the frozen meat and dairy industries was built. The foundation lay in the land laid open to settlement, in the roads, bridges, railways, buildings, and harbours which had been built, and not least in the immigrants who had arrived. Vogel's dream of a great and prosperous country was yet to come true.



Map drawn by Lands and Survey Dept., Wellington.

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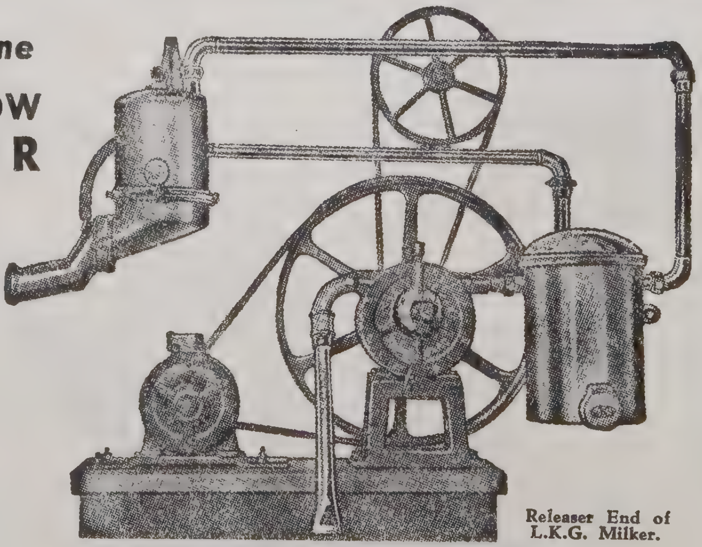
Releaser End of L.K.G. Milker.

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A SMALL FARMER IN TENNESSEE

Typical Operations in TVA Area

The agricultural extension and development activities of the Tennessee Valley Authority, which have opened up a new vista of hope and security for many small farmers in the United States, have aroused great interest among agriculturists throughout the world. This article by I. P. Conger, Agricultural Relations Department, TVA, Knoxville, Tenn., describes a typical small property in the TVA area and how the farmer has been assisted to success and independence.

WEBB SHOFNER, age 35, with his wife and two children, Ann 8 and Donald 14, may well be considered a representative farm family living on their 220-acre farm five miles from their county seat, Fayetteville, and 80 miles from the nearest city, Nashville, Tennessee.

The Farm

Their farm is twice as large as the average, but farm practice is typical of that on properties of full-time farmers who, like Webb, supply work for a tenant family living on the place. The tenant on the Shofner farm has a son of working age, so there are 3 men workers available. Children of both families do odd jobs on the farm and in gardens.

The farm lies across a rather broad rolling valley and reaches up to fairly steep stony ridges. A rather large creek provides adequate water for stock and experimental irrigation. The west side of the stream, approximately one half of the farm, is mostly steep pasture and wooded land, so that livestock is important in his system of farming. The remaining portion is level to rolling and suitable for cultivation or rotation of crops.

Diversified Crops

Mr. Shofner does not place undue reliance on any one product for his income, preferring to engage in a widely-diversified type of farming. Most of his crops are grown for feed, but cash crops of tobacco, seeds from white and crimson clover, and small grains contribute well to his income throughout the year.

[Photographs by courtesy of Tennessee Valley Authority.

Upper—Dairy cows on sheep pasture. The herd averages 300lb. of fat per cow annually. Middle—Pigs are pastured on alfalfa until May and fed maize in self-feeders. Lower—TVA experimental sprinkler equipment on wheat and white Dutch clover. Ten sprinklers distribute 6000 gallons in an hour.

A SMALL FARMER IN TENNESSEE . . .

Bluegrass (*Poa pratensis*), white clover, and redtop, with sometimes cocksfoot and timothy, is the usual permanent pasture mixture. Common or korean lespedeza usually seeds naturally and adds greatly to pasturage during the hot, dry months of July and August.

Rotations

Crop rotations vary from two to several years in the following manner:—

2-year rotation:

Maize (or cotton further south)
Small grains and crimson clover or vetch
Soy bean or similar late hay crop—wheat, vetch
Maize again.

3 or 4-year rotation:

Maize
Wheat and red clover (or lespedeza)
Red clover (or lespedeza)
Red clover

Long-term rotation:

Bluegrass 6 to 8 years
Maize or tobacco (burley) 1 year
Small grains, clover 1 year
Clover 1–2 years

Some "progressive" farmers are now using a grain and clover rotation almost entirely and eliminating large-area row crops. Shofner is showing a tendency towards less maize, which is his largest row or cultivated crop.

Root crops for stock feed are not grown in the area, farmers depending entirely on grain, forage, and supplementary protein and mineral feeds.

Tobacco is an important cash crop which requires much hand labour and a small area of highly-productive land. One man usually grows ½ to 1 acre, depending on other work and the availability of extra help at harvesting time. Shofner's farm grows ½ an acre, producing some 800 to 900lb., which sold at the mid-winter auctions during the war for 40 cents (2/6) or better per pound.

Livestock

Milk produced from 15 to 20 Jersey cows, a few of which are purebred, provides a cash income of obvious importance.

The poultry flock of about 75, together with the vegetable garden, provides food for both families. Usually enough eggs and poultry are sold to buy necessary groceries.

Twenty-five to 30 sheep are kept and 2 or 3 brood sows. A team of mules and 3 brood mares do much of the work, but a rubber-tyred tractor provides power for most of the heavy field work.

Pastures and Feed

The variety of stock raised fits well into the pasture and feed production programme, because good pasture can be provided 9 months of the year. A mild winter can extend this grazing period another month, and light grazing can continue all winter except during wet weather on autumn-sown cover crops. Small grains and crimson clover provide most of the winter pasture. Bluegrass and white clover provide autumn pasturage while the winter cover crops are getting established.

White and crimson clovers are grazed in the spring and their seed harvested later with a small combine. This seed, the harvest of small grains, and the spring lamb crop provide a good late spring income.

Most of the autumn harvest is stored for feed, but crops such as potatoes, fruit, and lespedeza seed, as well as culled poultry and other livestock, provide an autumn income. Further south cotton is the main crop harvested and sold during the autumn and winter. Picking usually starts in October.

Equipment

Shofner's farm equipment consists of the usual tillage and seeding machinery and a tractor. He owns a combine, seed cleaner, and feed grinder, and has storage capacity for his average production. The main livestock barn is old and rather dilapidated, but his home, built in 1938, is modernly equipped with an electric stove, refrigerator, water heater, running water, washing machine, iron, and radio. Cows are milked by hand, but with the war ended a milking machine may be installed.

TVA Irrigation

Because this young farmer was aggressive and willing, an experimental irrigation system was installed on his farm by the Tennessee Valley Authority. Twelve acres can be watered by portable sprays supplied by stationary mains and laterals, with water drawn from the creek by an electric motor. Bluegrass (*Poa pratensis*) and white clover pasture and alfalfa and maize in rotation with small grains and clovers have been irrigated during a 4-year period with the result that Mr. Shofner plans to purchase the system at its appraised value of $1200 (£400), having decided that he cannot afford to be without it. Although 50in. of rain are fairly well distributed throughout the year, mid-summer droughts, which often last 3, 4, or 6 weeks, necessitate irrigation.

Mr. Shofner's farm is not considered large, yet he is able to maintain more machinery than the average farm because he does "custom" (contract) work for other farmers. This is largely confined to work of the combine and seed cleaner and certain tractor work.

A silo has not been built on the farm, although it would probably be of advantage to his dairying enterprise, but his success with increased production of winter pasture may compensate for this.

Mr. Shofner is a diligent and intelligent farmer who takes advantage of opportunities and has made unusual progress in 12 years of farming. He started in 1934 with virtually nothing but a will to purchase a farm and make a success of his business, and he now owns his farm and equipment.

Usual Acreage Uses

	Acres.
Total	220
Cleared	190
Row crops (maize & tobacco)	27
Oats	9
Rye and Wheat..	40
Barley	10
Hay—alfalfa, red clover, and lespedeza	21
Winter legumes—vetch, crimson and white clovers ..	33
Permanent pasture	62
Long-rotation pasture ..	8

Average Yields per Acre

Corn (maize)	40 bu.
Small grain	17 bu.
Hay	2 tons

Balance Sheet for 1942

RECEIPTS	Dols.
Grain	1271
Dairy products ..	1709
Cattle	466
Sheep and Wool	132
Hogs	1796
Poultry and Eggs	252
Other sales	496
Total receipts	$6122 (£1960)

EXPENSES	Dols.
Labour	506
Repairs and Depreciation	484
Feed	713
Seed	45
Fertiliser	100
Milk hauling	175
Other expenses..	747
	$2770 (£885)

Farm income 3352 dols. (£1075).

Radio Broadcasts

RADIO talks to farmers will be given from Station 1YA, Auckland, at 7.15 p.m. on the following dates:—

April 14 — "Current Farming Problems," by E. B. Glanville, Assistant Fields Superintendent, Auckland, and P. S. Syme, Instructor in Agriculture, Warkworth.

April 21—Talk by a veterinarian of the Livestock Division.

April 28—Young Farmers' Clubs session by a representative of the Eastern Bay of Plenty Y.F.C. District Committee.

FARM WORK FOR APRIL

By the Fields Division

CULTIVATION

MANY paddocks recently in crop should be prepared for the following crop without delay. Too frequently the stubble of headed cereals is left standing in the paddock until the spring, because autumn cultivation work that could have been undertaken is postponed, with the result that conditions become too wet for further work until after the winter. That results in too hurried a preparation in the spring, with insufficient time for proper burying and disintegration of stubble. There is also a tendency to leave the ploughing up of grassland in preparation for a crop till later than is desirable. That may not be caused by procrastination as much as by the ability of present-day farm machinery to prepare land quickly for crop or pasture. Such quick preparation ignores the value of weathering between operations and the necessity for adequate rotting of turf or straw and its incorporation in the soil.

Treatment of Lea Land: Before being deep ploughed, pasture land requires some previous work so that the turf can be dealt with adequately. The choice for pre-ploughing treatment lies between skim-ploughing, discing, and grubbing or hustling. Where the land is not treated before deep ploughing, rolling on the furrow will help the decomposition of vegetation, which is prevented by the leaving of air spaces between furrows.

Importance of Fallow. — After autumn-harvested crops, land is often rushed immediately into temporary or permanent pasture or another crop, frequently with inadequate preparation. A period in fallow is often regarded as wasteful, but frequently the difference between the success and failure of a pasture lies in the use of a fallow. Pasture sown in the late autumn after a cereal seldom does well. When it is desired to sow pasture after wheat, a greenfeed crop may first be taken, the land ploughed again in the spring, and fallowed so that pasture may be sown early in the following autumn—January or February. Fallowing means not merely leaving uncropped land idle, but working the land from time to time to eliminate weeds and twitch.

Preparing Land for Wheat.—Land should now be prepared for autumn-sown wheat. The harvesting of the preceding crop will determine the time at which work may be started. Where wheat is being sown after grass, work should now be well under way. After peas, oats, barley, or rape it should be possible to give the first working very soon if it has not already been done. Too much cultivation in preparing the final seed-bed for wheat, resulting in a fine bed, may be disastrous because of the setting and caking of the soil under the winter rains. **The seed-bed for wheat should be reasonably fine and firm, and well worked beneath, but should have a rubbly surface.**

GRASSLAND WORK

A stocktaking of pastures to decide on the measures necessary for the best use of available grass is wise at this time of the year. Topdressing work which may be undertaken at this time is dealt with in an article by P. R. Barrer elsewhere in this issue. Care in grazing management is particularly necessary at present.

Conserving Grass on Sheep Farms.—On most sheep farms stock numbers have now been reduced to the winter carrying capacity, but usually the autumn flush of feed exceeds stock requirements. Even on farms where a controlled system of rotational grazing is not usually practised it is possible to shut up paddocks to be used later for winter grazing. That method of grass conservation is used on farms as widely different as the South Island high country, where there is "summer" and "winter" country, and well-subdivided North Island fattening farms. A system of rotational grazing is, after all, only a regular and organised extension of that practice. Special paddocks of young or fresh grass should also be used at this time for flushing ewes. Hoggets should be given preferential treatment so that they may enter the winter in good condition.

Pasture Work on Dairy Farms.—The selection of paddocks for feeding-out purposes should be considered now, though in most districts feeding out will not begin in April. Paddocks which become too wet in the winter should be used now if possible to save others for winter use. The most suitable paddocks for feeding out may be

1. Those which have run out and are shortly to be resown;
2. Areas which have been ruined by grass-grub and where consolidation and the addition of seed from the hay will be helpful; and
3. Light land.

Care should be exercised in the feeding off of new pastures; they should not be fed too heavily or when the field is wet. Pastures should be harrowed before winter to spread droppings.

HARVESTING RED CLOVER SEED

Red clover seed is frequently damaged when being header-harvested, resulting in slightly chipped and broken seed which cannot be removed by machine dressing. Farmers and operators should take every care to avoid such damage. The following remarks by E. G. Smith, Fields Instructor, Rangiora, in the "Journal of Agriculture" of February, 1944, should be remembered:—

"Settings advocated by the makers of header harvesters are intended only as a guide, and adjustments are made necessary by variations in crops and climate. It is therefore advisable to examine the seed as well as the straw at frequent intervals throughout the day. Damage to red clover seed is usually caused by an incorrect setting of the concaves to the drum. Though in the case of the peg drum the severity of threshing is governed by the number of pegs in the concaves, even if clover is being broken it is not usually advisable to reduce the number of pegs, as inaccurate centring of the pegs is the most likely cause of the trouble. Whether it be beater or peg drum, an accurate setting and a fast riddle speed result not only in efficient threshing but also in preventing overloading of the riddles, thereby ensuring that an excessive amount of material is not returned to the drum for re-threshing. If seed is being lost with the chaff, care should be taken to see that the blast is not reduced sufficiently to allow the material to lie 'dead' on the riddles. By opening the riddles this loss of seed can be overcome."

LUCERNE

The last cut of lucerne is often taken in March. Frequently it is a light cut which may be fed out green particularly on dry areas or in dry autumns. After the last cut weed infestation in the crop will become more noticeable.

Many farmers are tempted to cultivate the lucerne stand with penetrating harrows after the last cut to eliminate weeds, but probably more harm than good is done throughout New Zealand by surface tillage of lucerne. Lucerne is dormant during the winter, but after the first cut in the spring the lucerne growth competes strongly with weeds. If the weeds are only annuals, the lucerne should gain the upper hand during the growing season. If the worst weeds are grass or twitchy weeds, cultivation sufficiently severe to destroy most of them will certainly reduce the number of lucerne plants. The ability of lucerne to reduce in time the infestation of areas with Californian thistle by smothering and competition is fairly well known. The most success in improving a lucerne stand is likely to result from better fertility and management—building up the vigour of the lucerne stand so that it may undertake its own competition with weeds.

Liming and topdressing are very beneficial to lucerne, but as the crop is dormant in the winter it should be topdressed in the spring, not in the autumn.

◆

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Extra Traction for Pneumatic-tyred Tractors

By M. W. CROSS, *Farm Machinery Demonstrator, Massey Agricultural College.*

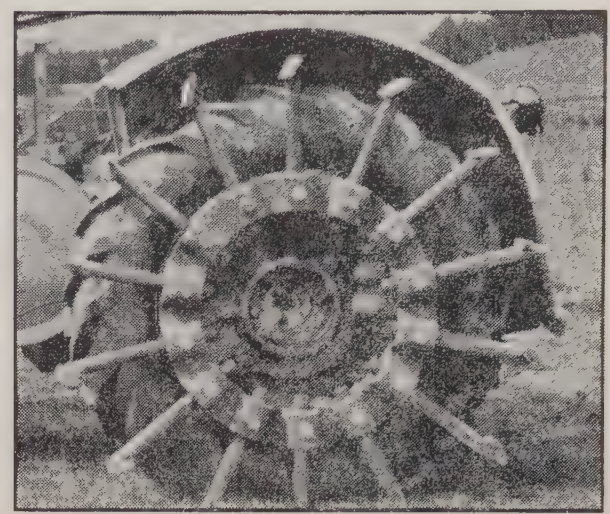
A RECENT addition to methods of improving the traction of pneumatic-tyred tractors is the Bower wheel, a pair of which has been demonstrated at Massey Agricultural College, Palmerston North, on several occasions. This attachment has met with success in England and between 8000 and 10,000 pairs have been sold.

THE attachment consists of a casting with 14 adjustable lugs clamped to each rear wheel. Two bolts clamp the unit to the tractor wheel and the drive is transferred from the tractor wheel to the Bower wheel by two forked lugs fitting over projecting studs on the tractor wheel.

When not required the lugs are retracted and in no way interefere with the running of the tractor on roads or firm ground. Each unit, which weighs about 3cwt., then acts as a wheel weight, further increasing traction. Should difficult conditions be experienced, one man may extend the lugs the desired distance in 15 minutes. Each lug is secured by one bolt.

Periodical inspection is necessary to ensure that the bolts are not loosening. Should the lugs become loose and twist round when in the retracted position, severe damage will be caused to the tyre. If the threads of each bolt are rubbed with graphite, rusting may be prevented and the work of adjustment made much easier. All lugs should be extended to the same distance to obviate uneven grip on the ground and the possibility of starting wheel slip.

When used for ploughing the extension of the lugs on the land wheel eliminated all wheel slip, but it was found necessary to remove the lugs—not the whole casting—from the furrow wheel, as the extra width caused the front furrow to fall flat. This occurred with a plough set for 11in. furrows. The lugs also had to be removed for row-crop intercultivation. Discing and other top work can be carried out quite satisfactorily, the angle of the lugs giving a packing action in loose soils.



Bower wheel attached with lugs extended. Depth of penetration can be varied up to about 6in.

All points considered, the Bower wheel seems a worthwhile attachment, its main advantages being:

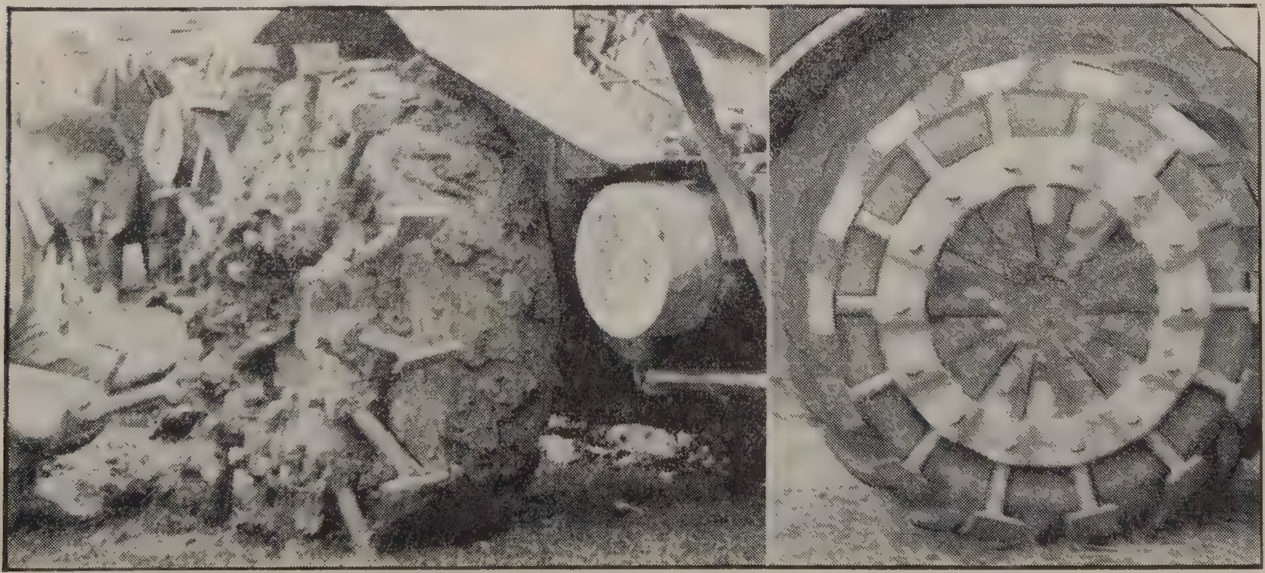
1. There is no necessity to remove the attachment when it is not required; it then acts as a wheel weight.

2. Change over from field to road work and vice vehsa requires only 15 minutes of easy work.

3. Should the tractor become stuck, having the attachment already fitted is a great time saver; the lugs can be extended without difficulty no matter how deeply the machine may be bogged.

4. When the lugs are in use the pneumatic tyre still bears on the ground, providing extra grip.

5. The Bower wheel is made in various sizes to fit any type or size of tractor wheel.



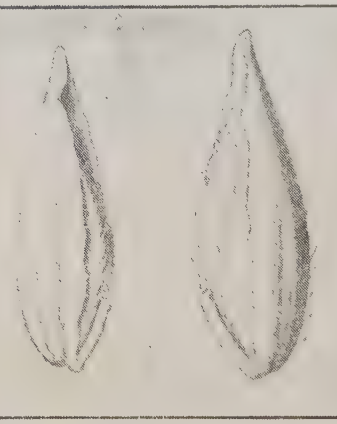
Left.—Adjusting the lugs. A forked lug fits over the projecting stud on the tractor wheel. A mole drain plough set at 18in. deep with a 2½in. plug is attached to the tractor. Right.—The lugs retracted.

Weed Seeds In Agricultural Seed

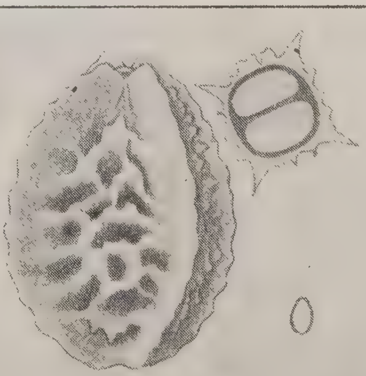
(Eleventh Series).

By

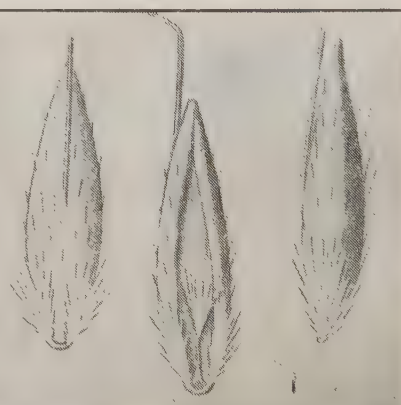
E. O. C. Hyde,
Officer in Charge, Seed-testing Station,
Palmerston North.



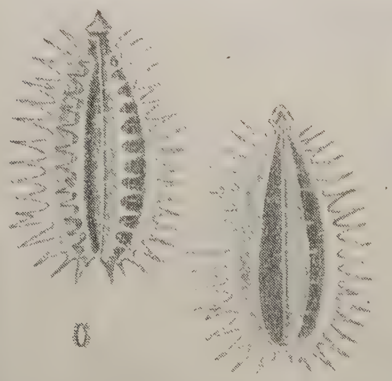
POA ANNUA: ANNUAL MEADOW-GRASS. Straw coloured. Occurs frequently in the smaller grass and clover seeds. An annual grass very common in open pastures.



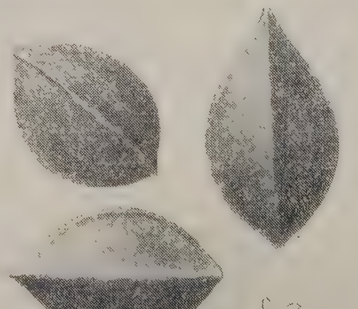
SANGUISORBA MINOR: SALAD BURNET. Colour brown. Occurs rarely in ryegrass and danthonia. A perennial weed of dry pastures.



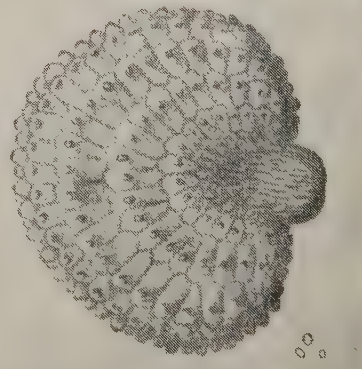
DEYEUXIA FORSTERI: Straw coloured. Occurs with medium frequency in crested dogstail, browntop, and chewings fescue seed. A native annual grass.



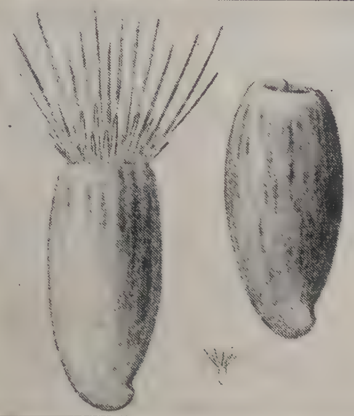
DAUCUS CAROTA: WILD CARROT. Colour brown. Occurs infrequently in red clover, cocksfoot, and ryegrass. In Canada classed as a secondary noxious weed seed. A biennial weed, not aggressive in this country.



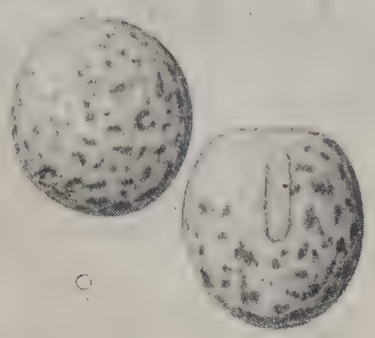
RUMEX ACETOSA: SORREL. Colour dark brown to black with lighter margins. Occurs frequently in meadow foxtail seed from Europe; rarely in New Zealand grass and clover seed. Australia admits not more than 20 seeds an ounce. A perennial weed of wet pasture land.



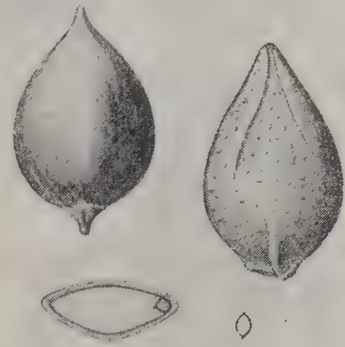
SILENE CUCUBALIS: BLADDER CAMPION. Colour dark grey to black. Occurs infrequently in red clover. In Canada classed as a primary noxious weed seed Australia prohibits importation. A perennial weed of cultivated land.



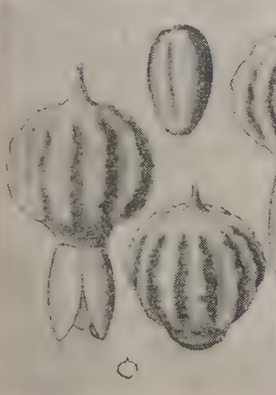
CENTAUREA SOLSTITIALIS: YELLOW STAR THISTLE. Colour light to dark brown with dark flecks. Occurs infrequently in cereals, ryegrass, and cocksfoot. A prohibited weed seed in Australia. An annual weed of pastures and waste land.



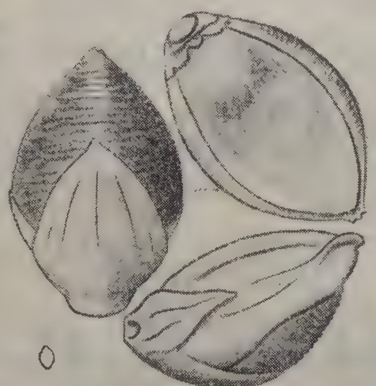
VICIA TETRASPERMA: SMOOTH TARE. Colour light greenish-brown with dark mottling. Occurs with medium frequency in cereals and in cocksfoot, ryegrass, and red clover. A common annual weed.



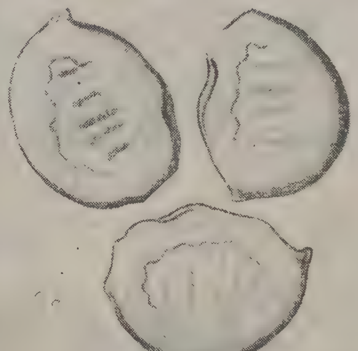
POLYGONUM HYDROPIPER: SMARTWEED. Colour dark brown to black. Occurs infrequently in ryegrass, strawberry clover, and red clover. Australia admits not more than 30 seeds an ounce. An annual weed of wet land.



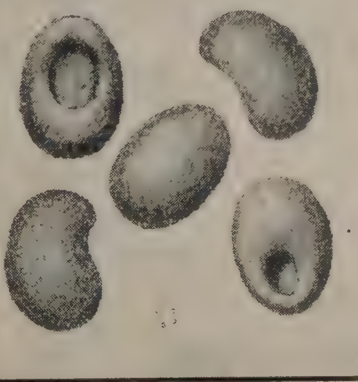
RAPISTRUM RUGOSUM: TURNIP WEED. Colour brown. Occurs rarely in cereals. A prohibited weed seed in Australia. An annual or biennial weed, not troublesome in this country.



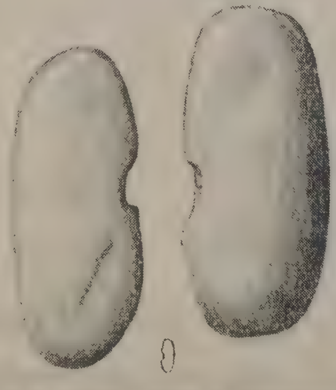
SETARIA LUTESCENS: PIGEON GRASS. Colour yellow to brown. Occurs rarely in red clover. An annual weed of cultivated land.



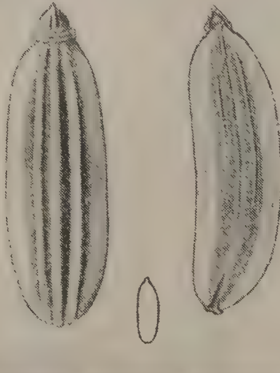
RANUNCULUS SCELERATUS: CELERY-LEAVED BUTTERCUP. Colour light brown. Occurs rarely in white clover. Australia admits not more than 20 seeds an ounce. An annual weed of wet pastures.



GALIUM PARISIENSE: SLENDER BEDSTRAW. Colour black. Occurs with medium frequency in *Lotus major* and *Lotus hispidus* and rarely in white clover. An annual weed of pastures on dry land.

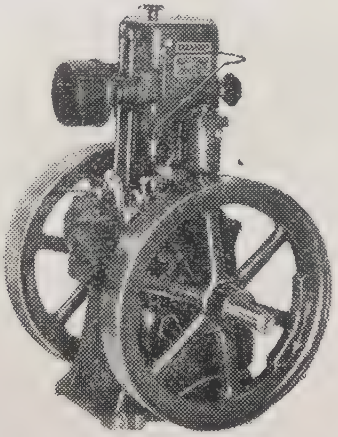


GALEGA OFFICINALIS: GOAT'S RUE. Colour yellow to brown, often tinged with green. Occurs very rarely in cocksfoot and ryegrass. A perennial pasture weed common on silty flats bordering the Manawatu River.



FOENICULUM VULGARE: FENNEL. Colour brown. Occurs very rarely in cocksfoot. Australia admits not more than 10 seeds an ounce. A perennial weed of dry roadsides and waste places.

FROM WAR TO PEACE . . .



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Feeding the Dairy Herd

FRESH PASTURE THE BEST DIET FOR COWS IN MILK

By M. M. COOPER, *Massey Agricultural College.*

FEEDING, and not breeding, is the factor limiting production on most New Zealand dairy farms. If the average farmer could feed his herd as well as the most efficient, production would be not far below 300lb. of butterfat a cow. Sixty guineas spent on a well-bred bull can be a poor investment if the standard of nutrition on the farm is not in keeping with the price paid for the herd sire. On many farms it would be more profitable to spend half the money on the bull and put the balance into topdressing, pasture improvement, or the sowing of supplementary feed.

IT is not possible, however, to dogmatise on the best methods of feeding. By observing the reaction of their stock and their bank balances successful farmers have evolved very different systems of feeding and feed conservation to suit the circumstances of their farms. The following examples from the Manawatu district may be quoted:

One herd of about 50 cows averages nearly 450lb. of butterfat a cow on pasture, mangolds, and ample hay (about 1¼ tons a cow is saved annually).

A 60-cow herd for town milk supply averages 400lb. of butterfat a cow on grass and silage. This farmer rations autumn grass throughout the winter by means of an electric fence, and on about 90 acres produces 60,000 gallons of milk a year. He does no cropping and saves no hay.

A third farmer, on heavy swamp country, produces 270lb. of butterfat to the acre from grass and silage. Because of heavy bottom growth and damp soil he found it difficult to make good hay, and so he turned to silage, with first-class results.

A fourth Manawatu herd, of 120 cows, averages 350lb. of butterfat on a more or less conventional diet of grass, silage, hay, and supplementary crops. This herd is also fed autumn grass in the late winter and early spring in breaks limited by an electric fence. Seasonal production is characterised by an early peak, indicating the great value of this grass at a critical period of feed supply.

Good pasture management is common to all these farms. Each farmer realises that fresh, leafy pasture is the best and cheapest food for milking stock under New Zealand conditions, and that no crop or conserved pasture can approach good grass in efficiency. The main effort in each instance is to provide a supply of such grass for as long as possible during the dairying season.

Stages of Pasture Growth

But grass has deficiencies as well as virtues. About three-quarters of its growth is made in six months of the year, it is greatly affected by climate, and its quality varies widely with the stage of growth. Shakespeare, for dramatic purposes, recognised seven stages of man: For nutritional purposes it is important to recognise four stages of pasture.

The first is the young and immature stage best described as "sappy." That is the dangerous stage associated with scouring, facial eczema, grass staggers, and similar dietetic troubles.

The second is the leafy stage when fibre has risen sufficiently to give the pasture some substance. It is often described as the 4 to 5in. stage, but in mid-spring the grass can grow to a foot and still retain its desirable nutritive qualities. At that stage—just before the main species break into seed heads—it can be cut and handled conveniently to provide material for first-class silage. Such silage, properly made, will have a high feed value and will be very suitable for feeding to stock when they are in heavy production—for example, in a dry summer period or just after calving. In fact, the best of the silage should always be reserved for such periods and the inferior qualities for periods when the stock are dry.

AUTHOR'S ENGLISH APPOINTMENT

The author of this article, who holds the degrees of B.Agr.Sc., B.Litt. (Oxon), and Diploma of Rural Economy (Oxon), has been head of the Dairy Husbandry Department at Massey Agricultural College, Palmerston North, since he was discharged from the Second N.Z.E.F. with the rank of major early last year. He has now been appointed to the Chair of Agriculture recently established by the University of London, and tenable at Wye College (formerly the South-eastern Agricultural College), near Ashford. Mr. Cooper has had wide experience of farming in New Zealand and Great Britain. He was a New Zealand Rhodes Scholar, and is still in his early thirties.

Grass-drying in Britain is carried out relatively early in this second stage. The product compares very favourably in feeding value with that favourite of concentrates, linseed cake. It is rich in protein, highly digestible, and capable of sustaining milk production at a high level. Grass-drying adds nothing to the food value of its product; all the value is present in grass at its best grazing stage.

The third stage in pasture growth is the flowering stage—the latest at which it should be cut for hay or silage. Compared with the preceding stage, the percentage of protein is lower, the percentage of fibre is higher, and there is a fall in digestibility. The pasture has passed from a "watery concentrate" to a roughage. No longer is it a food for high-producing stock; it has descended to the category of good maintenance food, with a little over for production.

In the last stage the seeds are mature, fibre has reached a maximum, and protein content and digestibility have fallen to the lowest levels. The pasture has then become second-rate roughage, with very limited value for dry stock. Too often grass is approaching this stage when it is cut for hay. Certainly hay is easily made with such a mature crop, but the product can never be classed as useful for the milking herd. Furthermore, the recovery of this late-cut pasture is not good. Cutting usually coincides with the driest spell of the year and the plant has been allowed to complete its full cycle of growth. Grazing or early cutting has a pruning effect and keeps the pasture in a juvenile, leafy state.

Mixed Pastures

Generally, New Zealand's best pastures consist dominantly of ryegrass and white clover. These two species are the mainstays, but a leavening of other species is valuable. In the warmer northern districts paspalum is particularly useful in the summer, for it grows actively at a time when ryegrass tends to slump; the Dominion's well-managed ryegrass-white clover-paspalum pastures are probably among the highest producing in the world. Where climate does not favour paspalum, cocksfoot may conveniently replace it to achieve a similar balancing of growth.

FEEDING THE DAIRY HERD . . .

A difficulty in the management of these mixed pastures is that one species may achieve such a dominance as to suppress the others and so depress annual production. That is true of paspalum, and it is characteristic of paspalum-dominant pastures that they give poor growth in the spring, when ryegrass is normally most active. To avoid such harmful dominance, paspalum pastures should be kept in check in the late summer. It is generally true that to suppress any species it should be hard grazed when it is making most active growth compared with other constituents of the pasture.

There is probably a place for special pastures on many dairy farms. Italian ryegrass gives good out-of-season growth and provides a valuable bite of grass at a critical time of pasture shortage. It has the disadvantage of being an annual, but a recently-developed hybrid type of ryegrass known as H1 promises well. It has the winter growth of Italian and much of the persistency of perennial. Field trials extending over five years indicate that this grass has a real future in lengthening the period of the year during which good grass will be available.

Extending Growing Season

The growing season of pasture can be extended by other means. Autumn topdressing with superphosphate, for instance, encourages winter growth and increases the proportion of out-of-season grass. Drainage of heavy country operates in two ways: Not only does it encourage the better-quality grasses with a long growing season, but it makes the soil warmer, permitting earlier active growth. Winter spelling of pastures also promotes earlier spring growth, as well as avoiding severe mechanical damage to pastures, with a consequent entry of docks and flat weed.

However, the most effective method of providing grass for the late winter is the "cool storage" of autumn grass. A proportion of the autumn flush is scrupulously saved for July-August, so that the newly-calved cows will have available a sufficiency of the "watery concentrate" necessary to high production. It has been estimated that this method of feeding, in which milking cows get a third to half of their total food requirements from this grass and the balance from hay and silage, means a gain in production of up to 20lb. of butterfat a cow.

The time of closing these paddocks will vary from district to district; in the Manawatu mid-April is usually suitable. It is very important that the pasture should be eaten out well and chain harrowed before being shut up, or the rough clumps will turn yellow and deteriorate badly at the base. That is the only waste, for in a normal season the clean, fresh growth will stand well through the winter, and in the hardest month of the year, August, the farmer can view with satisfaction a paddock of what is, for practical purposes, first-class spring pasture.

Feed Off in Breaks

In the utilisation of this grass feeding off by breaks is all-important, or the cows will waste more than they eat by dunging and trampling. The portable electric fence is very useful, and in a matter of a few minutes can be shifted to provide a fresh ration of grass daily. Supplements can be fed out on the area grazed the previous day.

The immediate food value of this saved pasture is not the only dividend the system pays. The growth response of these pastures after they have been eaten off is amazing. The grass benefits from going through most of the winter with plenty of cover to the crown, and from the return of stock fertility. The result is that such paddocks are as much as a fortnight ahead of paddocks grazed hard throughout the winter. One of the biggest obstacles to early spring growth is severe defoliation in the winter and the consequent pugging resulting from such heavy grazing.

The driest and best-drained portions of the farm should be closed up; with heavy land there is too much damage to the sward in wet weather.

Rotational Grazing

It is generally agreed that the maximum of nutrients is obtained from pasture by a system of rotational grazing. That does not mean that the farm should be closely subdivided by expensive full-scale fencing. On a dairy farm the job can be done just as well by three wires and a post to the chain, or by a properly-maintained electric fence. The important point is to have flexibility in grazing, so that every two or three days at least the herd is moved to a fresh paddock, and the paddock they leave is cleaned up by dry stock, chain harrowed, and the pasture allowed to grow to the desirable stage for grazing.

As the spring flush gets ahead of grazing demands, paddocks can be taken out of the grazing rotation and saved for hay or silage. If there are insufficient subdivisions, this surplus feed is invariably left as rough clumps of very low feed value which will be neglected by the milking herd until feed becomes so short that they have to be eaten. If a farmer regards these clumps as weeds in his pasture, he will have the right attitude toward them.

The first surplus of feed usually comes before the normal time of closing pastures for hay, and in that respect silage is useful. If this surplus feed is used for silage, it can be cut in late October-early November, when haymaking is not feasible because of the weather. But the weather is ideal for recovery, and within a month the silage paddocks can be back in the grazing rotation, at a time when grass normally becomes a little short.

Bias Against Silage

There is much bias against silage, but why that should be is difficult to understand. Well-made silage is a good food for milking stock. It provides a means of conserving grass when it still has a good food value. It is not so liable to weather damage as hay, and though the losses in food value in ensiling are considerable, they are not heavier than in haymaking, particularly if the hay is affected by weather or left to become over-mature. Harvesting is spread—every acre of silage cut in November is an acre less of hay to be made in December. There is greater flexibility in paddocks being taken out of or returned to the grazing rotation, and the aftermath from early-cut silage is much better than from late-cut hay.

The main objection to silage is the heavy lifting involved, but silage is handled only once to the stack or pit. Though hay is lighter, it may have to be handled three or four times, according to the system of haymaking and the weather. There is also the anxiety about getting the hay in in reasonable condition. From the aspects of both farm and pasture management, silage has much to recommend it in districts of abundant pasture growth.

Because of the variation in pasture growth with the weather from season to season, too much stress cannot be laid on the necessity for adequate food reserves. The farmer must cater not only for the average season but for the abnormal season. If he comes out of a winter with 10 tons of hay and 50 tons of silage as a surplus, he should not feel that it provides an excuse for saving less in the following year; he should regard it as a reserve with which to cope with the bad season which inevitably turns up every few years.

Pasture is the economic strength of New Zealand farming, but it can also be a weakness if provision is not made for the difficult days.

PLANTING ROUND THE HOMESTEAD

By M. SUTHERLAND, *Farm Forestry Officer, Rural Development Division, Wellington.*

FARM dwellers are inherently folk who consciously or unknowingly like the "wide open spaces," but even such hardy souls must have moments when they appreciate the fact that on a cold, blustering day they can return to their homes within the calm space of a sheltered yard or garden where the force of the elements is arrested and man and beast can feed and rest in warmth and peacefulness. Such a farm homestead, where surroundings can produce a feeling of pleasure and serenity in the observer, is contributing to the enrichment of rural welfare in the unstable and expanding activity which goes to make up our modern way of life.

MOST farmers' wives and their families spend more time in and around their homes than does the average town dweller, and they look on the homestead as the centre of their farming activity. It is right, therefore, that the farm house and its surroundings should be worthy of the effort put into the tillage of the land and that the impression given by the home should be commensurate with the results achieved by the farmers' labour and skill.

Which of the homes illustrated on the next page would you rather live in? One remains naked and detached from the land; the other is clothed with gardens and trees and appears to nestle into the countryside as if it belonged there. In the first no thought appears to have been given to conditions outside the house; in the other wise planning has achieved an individualism for the farm and evolved a gracious and pleasant home environment. It is a truism that well-cared-for buildings and home denote a careful and competent farmer.

Early Settlers' Work

All the homesteads of New Zealand were either carved out of the bush or built on the plain. In most cases they had a beginning very different from the present picture, but many now demonstrate the forethought and hard work of the first settlers and point to the possibilities of achievement when there is the will and determination to produce beauty with security.

It is gratifying and somewhat astonishing to find that in early and troublous times, amid all the task of breaking in the land, the settlers of New Zealand went to such lengths to make the business of fashioning a beautiful and comfortable home proceed hand in hand with the taming of the country to provide an adequate living.

The first seedling trees of *Pinus radiata* in Hawke's Bay are reputed to have been carried to that province by a settler who transported them in his saddle bag from Wellington as a trial planting for shelter near his home. Those settlers planned their new homesteads on much the same lines as homes in Britain, but the necessity for adjustments to suit the new climate was evidently recognised from the start. High tree shelter was one of the first requirements to be attended to, and the results may be seen in the belts and specimens of mature *Cupressus macrocarpa* and *Pinus radiata* about many of the old homesteads.

In the post-war planning of improvements in rural housing for provision of new farm homes for ex-servicemen, or for the remodelling of old farm houses to take advantage of modern methods of labour saving, the value of beauty and propriety in the home setting is becoming better recognised, and amenity together with utility is sought in new works.

Throughout the Dominion are to be found farmhouses which lack any planted amenities; many others show the results of good intentions but misdirected zeal, allowing Nature to race ahead and produce such unexpected results that the shelter trees now swamp the homes they were meant to protect. Such cases demonstrate one of the many pitfalls which await the enthusiastic but unwary planter.

In planning homestead shelter, whether for a new dwelling or to fit in with an established group, there are certain main requirements to be

TYPES OF HOMESTEAD SHELTER . . .

This home is naked and detached from the land.

aimed at and fulfilled gradually as growth and opportunity allow:

1. Shelter from the wind must be provided promptly and be of rapid growth.
2. The most suitable type of shelter should be chosen—high shelter or hedge shelter.
3. Only species suitable for the purpose and for the locality should be planted.
4. Shelter growth must be placed to the best advantage for maximum protection, and the homestead shelter should be planned to form a part of the general arrangement of the farm buildings, garden, and home paddock and to allow for future expansion.
5. Consideration must be given to fencing requirements and to the maintenance, trimming, and topping of shelter growth.

Work out a plan on these lines. The consideration given will undoubtedly provide a stimulus to action and will also prevent many of the mistakes which in a long-term project are costly to retrieve—planting too close to buildings, selection of wrong species, incorrect placing of trees, and the duplication of effort caused by working piecemeal instead of to a co-ordinated plan.

Rapidity of Growth

Rapidity of growth is governed partly by the species and type of shelter, but largely by the initial treatment given in planting. The rate of early height growth is increased by good soil preparation. Shelter trees planted in well-worked up or ploughed land will settle into their new positions and develop roots and height much sooner than the same plants placed directly into scantily-dug soil, which is not conducive to root formation.

Rapid initial growth of shelter planting is necessary whether it be required as tall trees or hedge shelter, and the question of the best height at which to aim must be considered in conjunction with decision of the type and species of shelter.

For both high shelter and hedges increase in height is perhaps most important in the first 10 years of growth. Even a young shelter belt gives a measure of protection, and there is a cumulative effect on all other vegetation within its sphere of influence, quite apart from the mechanical barricade which it presents between the dwelling and the wind.

But prolific growth in the species used for hedges is not sought beyond the first 6 to 8 years, as that would entail too much labour for topping or lateral trimming.

Type of Shelter

The higher the shelter belt the greater the area over which its effect is felt. In many cases, especially in flat country, a widespread effect is desired, but many tall-growing trees have a tendency to lose their lower branches naturally. A belt of high trees which is open below creates a strong draught along the ground in the vicinity, which detracts very heavily from the shelter value.

In homestead shelter this difficulty may be met by planting spreading shrubbery species as an interior bottom screen to the tall trees. That allows individual preferences and initiative in the arrangement of the area immediately around the house and should eventually produce a solid zone graded from high shrubs on the outside to low bushes in front merging into the garden boundary.

A belt of tall-growing trees planted at a suitable distance greatly enhances the appearance of a homestead as well as providing shelter. But consideration must be given to such precise points as configuration of the land in the vicinity, the area which can be included in the shelter scheme (high shelter requires the enclosure of a greater area than hedge shelter), the

A farmhouse clothed and nestling into the countryside.

quality of shelter obtained from each type. and the labour available for hedge maintenance.

Another point to be decided is the form of shelter belts. Are the trees to be planted as single or multiple rows? Are they to be planted in groups? Are high hedges to be relied on to shelter the house, and if so how much trimming will be necessary? Is shelter needed on only one side or is it necessary almost to surround the dwelling with tree growth?

A good rule is to use high shelter in a neighbourhood of high and gusty seasonal winds, because with this form the wind will be drawn up and over the dwelling and its environment; in localities of steady, strong, and constant winds high hedge shelter may prove the best protection.

To be successful high shelter requires precise planning and careful handling in the initial stages, but it also affords a wide choice of arrangement and species.

Many rehabilitated ex-servicemen and others taking up land find themselves perched on a bare hilltop, with their homes and farms open to all the winds that blow. Such a farmer must start to build up living shelter for his home and his stock, and a series of articles about shelter, of which this is the first, has been prepared to help him avoid mistakes made by planters in the past and to pass on to him knowledge gained from the experiences of farmers in many other localities. Later articles will deal with such aspects as the general procedure for planting homestead shelter on a small farm; high shelter and hedge shelter; suitable species for various types of shelter; species suited to regions; planting procedure; types of planting stock; shelter plans for different kinds of farms; the use of block shelter; the use of natural features in homestead shelter; and hedge planting and maintenance.

An alternative to shelter belts of high-growing trees adopted in districts of especially strong and constant winds is the formation of solid hedges of such strongly-growing species as *Pinus radiata* and *P. muricata*, *Cupressus macrocarpa*, or Lawson's cypress (*Chamaecyparis Lawsoniana*). Height growth is controlled by cutting back the leaders to an acceptable, useful height—say 10 to 20ft.—while impenetrability is preserved by constant pruning of the lateral branches. The advantages of this type of shelter are the increased protection from wind in the immediate vicinity, and the fact that the shelter can be closer to the dwelling, but it necessitates periodic, almost annual, heavy labour, and often produces a "hemmed-in" condition of the house.

. . . HIGH SHELTER NEAR THE HOMESTEAD

Pinus radiata planted 16 years ago for shelter now overtower the house.

The wind whistles through the base of this shelter belt.

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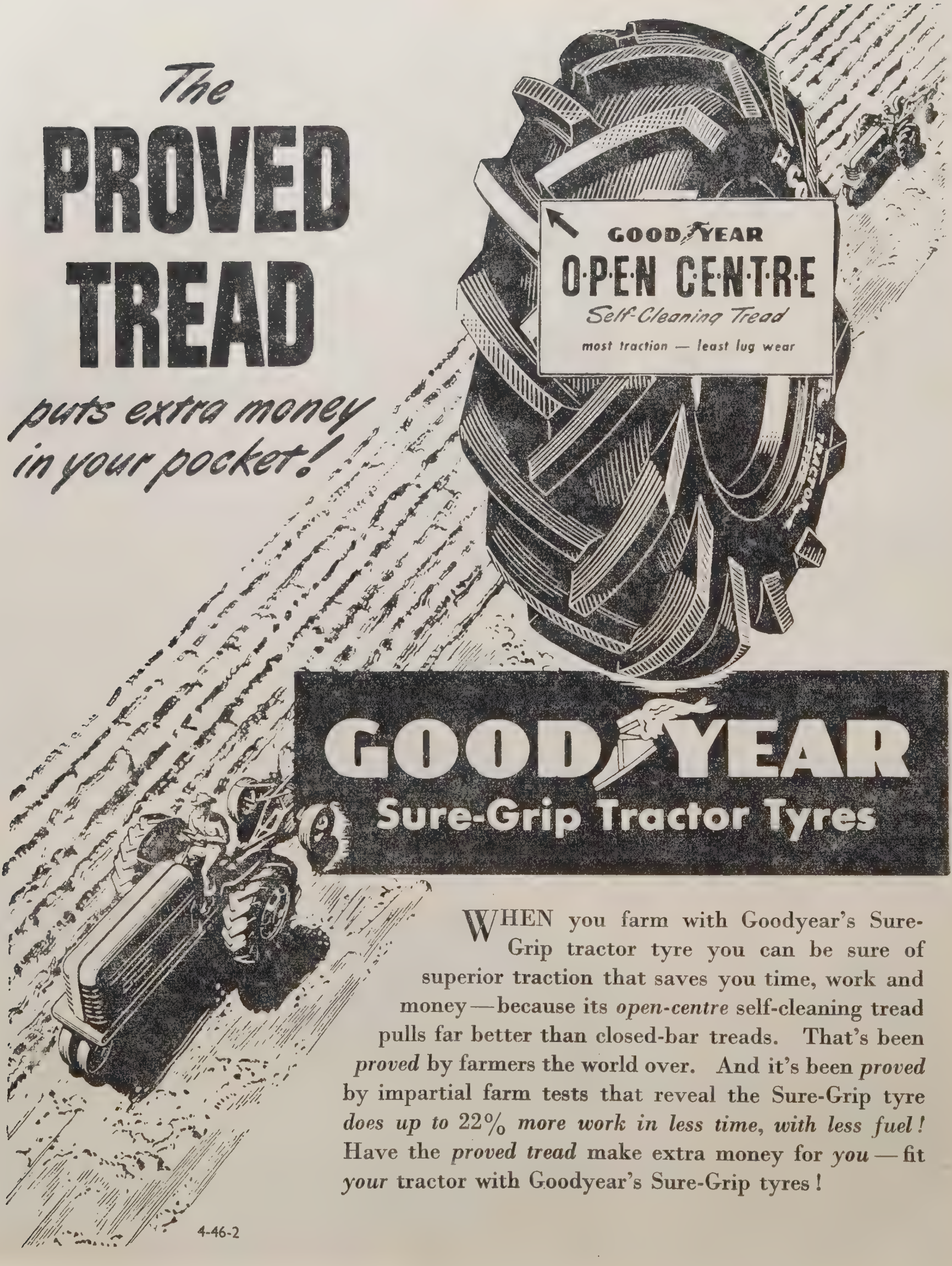
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Choice of Species

In all shelter planting the choice of species must depend on climate and soil conditions and on the type of shelter desired. Some species which will make excellent shelter hedge growth would never become tall timber trees, but there are such species as *Pinus radiata*, *Pinus muricata*, *Cupressus macrocarpa*, and Lawson's cypress which function equally well as high shelter or as hedges.

In general, choice of species should be confined to those which are seen to grow satisfactorily in the district. Frost-tender species which form standard shelter in the northern part of the Dominion cannot be expected to be of equal value in Otago Province. Rainfall and soil play perhaps the greatest part in determining the suitability of tree species. Such species as the sequoias and many deciduous trees will make no growth under adverse conditions, while the commoner species of pines and *Cupressus macrocarpa* appear to be almost universally adaptable, though their use should be confined to situations where better or more attractive trees cannot be grown.

Another difficulty arises when shelter belts or trees grow too rapidly for the position in which they are planted, resulting in a confined environment where the shelter trees overtop the house and create a danger from windfall—a very common fault in many homestead plantations of the past 20 or 30 years.

A good rule is to observe the growth of various trees in the district and base the choice of shelter trees on the results obtained.

In planting around the homestead where high shelter is desired efforts should be made to use as many varieties as possible. The high shelter line may be made up of rapid-growing evergreen and deciduous trees judiciously mixed, and, if species are used which habitually lose their lower branches, thick cover may be provided at the base by planting an interior line or shrubbery, at the same time introducing variety in shape and colour as viewed from the house.

If timber trees are required instead of a shrubbery, a still simpler scheme is to plant a double belt so that one line (for example eucalypts) provides height, and the other consolidates the base to form an impenetrable wind barrier, using, for example, Lawson's cypress or *Cupressus macrocarpa*.

A variety of tree shapes and colours used in a shelter belt driveway.

A high-grown shelter hedge which now overshadows and hems in the house.

Planning the Position

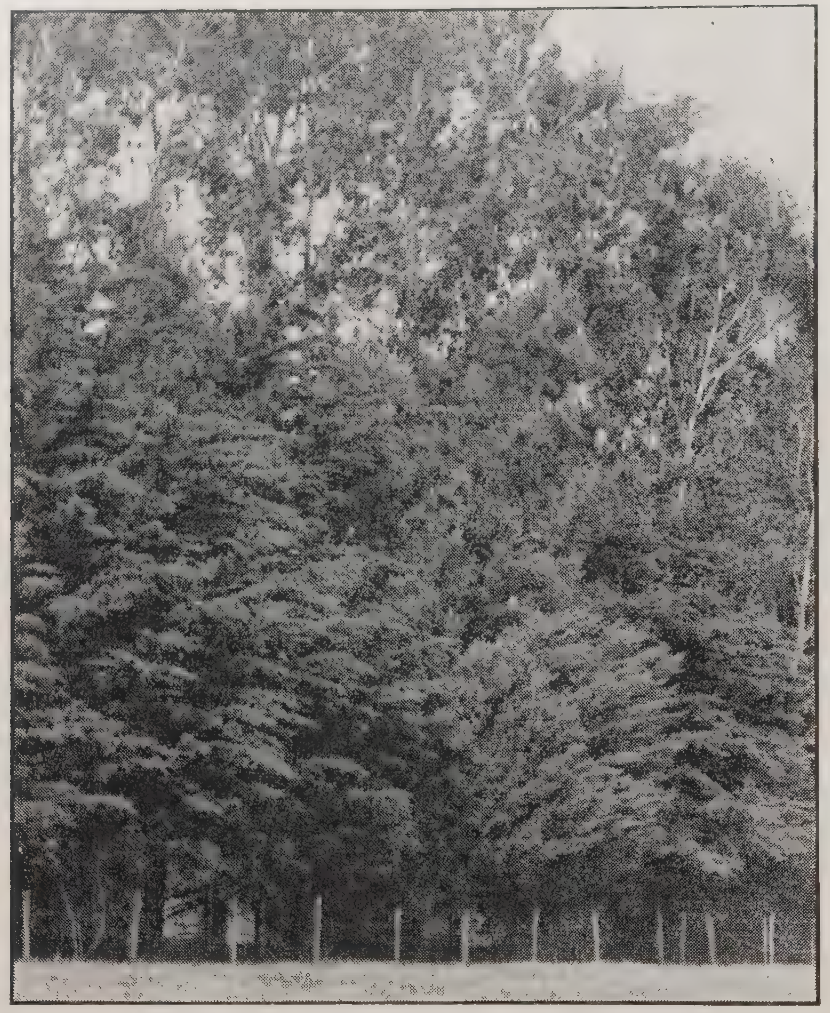
The growing of shelter plantations is an excellent investment for the farmer, as Nature carries on production at no cost, but they entail initial outlay in material and labour, and the maximum advantage should be obtained from them when they are established. It is important therefore to place shelter where it does the most good as a wind barrier, quite apart from the effect on the farmhouse environment as a whole.

In some districts there is only one prevailing wind against which protection must be provided; in others it is necessary to shelter against seasonal winds from diverse directions. In some cases full protection from the prevailing wind must exclude full sunlight, and a compromise between these necessities must be found. The precise location of homestead shelter can be decided only by the man or woman on the spot, but the choice of method for the provision of protection may be wide and varied, requiring consideration of many points of view.

Shape of Belts

The first question to be decided is the extent of the shelter eventually required for protection, comfort, and the enhancement of the surroundings.

Some farmers are satisfied with a straight line of shelter belt at right angles to the prevailing wind and exactly to windward of the house; such a plantation may be only long enough to shelter the house, or it may be extended to give partial shelter to other buildings and to garden or



High shelter made up of a row of tall eucalyptus trees filled in below by bushy *Cupressus macrocarpa.*

orchard. In some localities the minimum shelter can be obtained only by protecting against winds from two or more directions, necessitating an L-shaped belt or belts on opposite sides of the house. In more extreme cases protection may be necessary on three sides of a homestead, and economy of planting may be obtained by forming an arc-shaped shelter belt, which lends itself much more easily to a general scheme of homestead amenity planting.

In the planning stage it is necessary to try to envisage the appearance of the farmstead environs after about 20 years' growth, by which time the trees will have assumed their proportional area on the ground and fitted themselves into the general layout. Plenty of room to spread must be given to each tree; how much space one tree requires when it grows to maturity is seldom realised.

Preference may be given to a building and planting scheme which keeps the house and surroundings apart from the "work" parts of the farm, in which case two separate planting schemes are required, not dependent on each other. On the other hand, where working units are situated near the house shelter may be required for a compact farmstead block, in which case shelter planting must be considered in relation to the whole block and variations of planting adjusted to suit each group.

One farmer may be satisfied to plant shelter only around his house, ignoring the advantages of warm, sheltered buildings and yards. But farms which leave a favourable impression are usually those in which house and working buildings form part of a compact centre to the farm, and where the environs are protected by varied shelter plantings and shade trees, producing an effect of cohesion, protection, and "finish."

Making Use of the Driveway

The beauty of many homestead settings is spoilt by the lack of an agreeable approach—entrance from the roadway is by a track through a paddock, which may be given a good road surface but often is not even fenced off. In many cases the driveway can be used to divide paddocks, requiring only another fence line.

If the route followed coincides with the required direction for wind protection, the planting of the driveway may provide shelter and at the same time give a beautiful approach by the use of dual-purpose species of trees and shrubs which will give a pleasing variation in shape and seasonal colouring.

Importance of Planning

At the start of shelter planting it will not be possible or desirable to carry out more than a small part of any complete scheme, and most farmers will aim to establish shelter at the point where it is most urgently needed, adding to it each year as opportunity arises. It is therefore important to have an over-all plan for homestead and farm shelter and work to it in every year so that each portion will fall into its place in the general scheme. As the work progresses adjustments in placing or species can be carried out in the light of experience, and in the end the result will be an effective and attractive lay-out — not necessarily perfect, but one which both protects and beautifies the house.

Forethought is essential when planning the initial planting programme so that the scheme adopted can be made to fit in easily with expansion in the house and farm buildings or changes in garden, orchard, or paddock areas.

It is also advisable to consider in advance the maintenance which may become necessary before deciding on the type of planting to be carried out. For instance, all shelter trees planted must be protected from stock, so fencing and its upkeep are necessary; if hedges are decided on, provision must be made for labour for topping or annual trimming. The prudent farmer will weigh the cost of establishment and maintenance against the advantages of a well-laid-out, attractive homestead with its feeling of solidarity and comfort, its stimulus to further effort, and the enhanced value to the holding.

MAIZE GROWING FOR GRAIN

Bulletin No. 269, "Maize Growing for Grain," dealing with the sowing, cultivation, and harvesting of the maize crop, is now available **free** from any office of the Department of Agriculture.

Thousand-headed Kale and Chou Moellier

By W. R. LOBB, *Instructor in Agriculture, Dunedin.*

THE successful growing of fodder crops has contributed in no small measure to the expansion of New Zealand's livestock industry. During the early stage of farming in the Dominion both dairy and sheep farmers found that at some periods of the year grass and grass supplements were not sufficient to ensure the maximum production of milk, meat, or wool, and they had to resort to growing fodder crops to supplement the lean periods of pasture growth. Many crops have been used from time to time, such as rape, turnips, maize, pumpkins, barley, carrots, silver beet, mangolds, and the kales. Some have retained popularity in restricted localities and some throughout both islands, whereas others have failed to hold a place.

NOT the least important of these feed crops are the kales. They include many types, some of which have proved valuable for special purposes while others have lost popularity altogether. The two most important types today are marrow-stem kale (chou moellier) and thousand-headed kale. Those of less importance which have gained no place of prominence are buda kale, rape kale, Maori cabbage, and hungry gap kale. The last-named is a late form of rape kale with very curly leaves, claimed to supply feed in late winter and early spring, but it is not so resistant to root rots as the two more popular types.

The first reference to the kales is comparatively recent, and some of the selections are the product of this century. Thousand-headed kale is of older standing than chou moellier—in fact it is one of its parents. The credit for first seeing the possible value of chou moellier as a supplementary feed crop goes to Garton of England. Its early name of "French kale" may be misleading, though it is thought to have originated in France from a cross between thousand-headed kale and kohl rabi. It was introduced to commerce about 1907.

Increasing Area

The first mention of kales in New Zealand was in 1910, since when their use has continually expanded. It is significant that in recent years the area sown in turnips has shown a decided decrease, whereas the area devoted to the kales has gradually increased. During the same period the area in rape has remained relatively constant at about 150,000 acres. Today the kales account for 60,000 to 70,000 acres annually, of which about four-fifths is chou moellier.

The smaller area in chou moellier does not mean that it is of less importance than rape, but it has proved of greater value to the dairy farmer than to the sheep farmer. Chou moellier is an equally important crop in the North and South Islands.

Value as Fodder Crop

With the area planted in chou moellier extending persistently it was natural that its value as a fodder crop should receive the attention of research workers in New Zealand. Trials have been carried out by the Department of Agriculture since 1911-12 and by the Department of Scientific and Industrial Research since 1934-35. Breeding and selection work begun by Calder has resulted in the introduction to commerce of two distinct types of chou moellier (the giant selection and the medium-stemmed selection) and a selected strain of thousand-headed kale.

The following figures of the relative leaf and stem production and nutritive value of the three types are those obtained by Calder during his selection work:—

Relative Green Weight Yields.

Tall marrow-stem (giant) ..	100
Medium marrow-stem (medium stemmed)	81.1
Thousand-headed	72.8

Average Dry Matter Percentages.

Tall marrow-stem (giant) ..	19.7
Medium marrow-stem (medium stemmed)	20.4
Thousand-headed	22.4

Relative Dry Matter Yields.

Tall marrow-stem (giant) ..	100
Medium marrow-stem (medium stemmed)	86.4
Thousand-headed	81.8

Leaf to Stem Ratios.

	lb. per Plot. Leaf.	Stem.
Tall marrow-stem (giant)	13.6	21.4
Medium marrow-stem (medium stemmed) ..	13.3	15.1
Thousand-headed ..	18.0	7.5

These figures show the relative productive merits of each type and form a basis for consideration of the place of each in farm practice.

The budding of thousand-headed kale in August. This crop was sown thickly in ridges and was not thinned.

The fact that the giant type gives the highest total yield accounts for its popularity with the dairy farmer, especially in the more intensive dairying areas of the North Island, where the areas devoted to feed crops are small and this type suits local conditions and requirements.

The medium-stemmed type is more adaptable for feeding in the field and is favoured where larger areas are sown and where they are fed to sheep.

Thousand-headed kale is more extensively grown as a sheep feed, because of its higher production of leaf, and occasionally for early spring fodder for cows, as it stands well through the winter and produces its greatest bulk of growth in the second spring, being a safe fodder at that time.

CHOU MOELLIER (MARROW-STEM KALE).

The two distinct types of chou moellier, giant and medium stemmed, are grown for seed production in New Zealand under the supervision of the Department of Agriculture, such seed being marketed as Certified.

Soils and Climate

Being a member of the cabbage family, chou moellier is best suited to high-fertility soils. Undoubtedly the better crops are grown on first-class alluvial silts, in areas of higher rainfall — soils which also hold moisture

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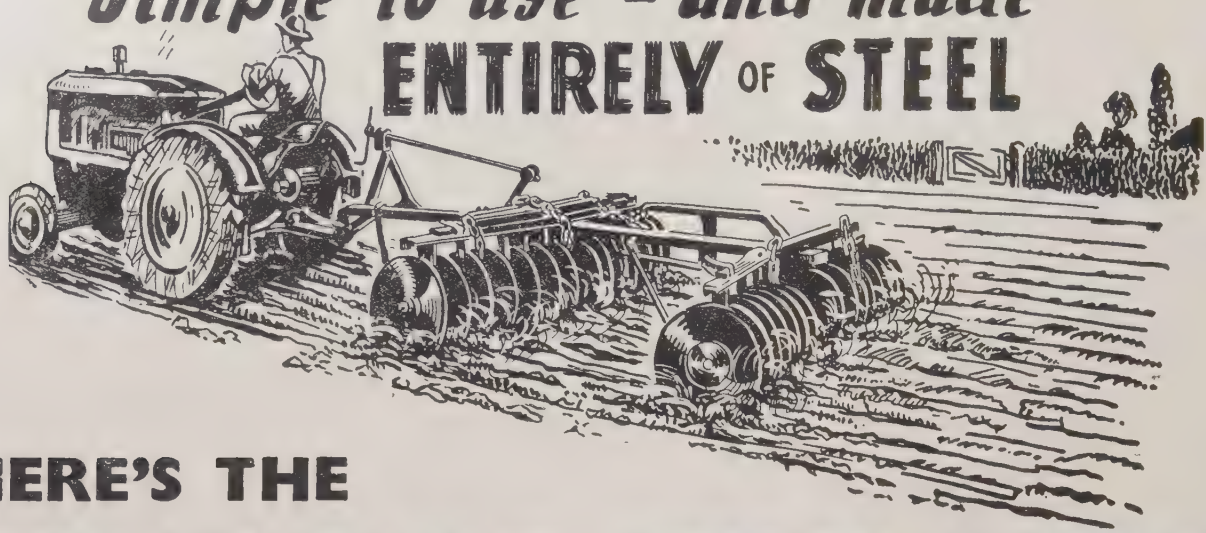

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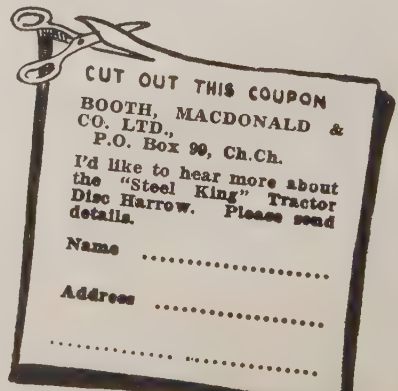

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well but are not liable to over-saturation. However, chou moellier has proved itself capable of good production on medium loams if given good cultural methods and liberal manuring. It is more popular in districts with moderate to good rainfall, but does well in both warm and cold districts.

For a long period after its introduction chou moellier growing was confined to the high-fertility soils, individual areas were small, and the crop received more attention than would be practicable today. With its more general use the methods of growing the crop have been considerably modified.

Cultural Methods

Early references to the growing of chou moellier all suggest treatments similar to those recommended today for cabbage. The seed was sown in nursery beds and the seedlings planted in rows up to 3ft. wide with the plants 2ft. apart. Cultivation was intensive and early weeding thorough. Small areas grown thus must have given the plant every chance to produce well-grown stems, resulting in a wealth of nutritious feeding.

It was not long, however, before a modified system was adopted which would make chou moellier more popular and extend its use—the sowing of the crop with the ridger. The crop was always thinned and intensively intercultivated. The aim, as previously, was to produce bulky, well-grown stems. That practice has been varied considerably since then, so that today chou moellier may be treated in any of the following ways: Sown in ridges and thinned; sown in ridges and not thinned; sown on the flat in 14in. drills or in 7in. drills; sown as an "umbrella" crop with swedes. All these methods are used with success in various districts and for different purposes.

Whatever the method adopted, one factor must be emphasised: The cultivation before sowing must be adequate and thorough. As with all heavy-feeding crops, the first essential to success is to plough early and work the ground well to ensure that the soil is in good heart.

An early deep ploughing, followed by discing, rolling, and harrowing, might well be followed by a second ploughing to make the soil sufficiently friable and well conditioned. These operations should not be rushed, as one of the most important factors in obtaining tilth and condition is time. In cold, backward springs extra-well-planned working of the soil is generally well repaid.

In a crop of thousand-headed kale as dense as this stock cannot wander indiscriminately, and loss of feed through tramping is avoided.

PIGS FOR PROFIT.

Pigs can bring profit. The requisite essentials in the pig department of the dairy farm are fully discussed in Bulletin No. 212, "Pigs for Profit," which is available free from offices of the Department of Agriculture. This bulletin is profusely illustrated.

Seeding and Manuring

The ultimate use of the crop and the area to be grown will determine the type to sow, the amount of seed, and the method of sowing. In small areas, such as are general in the north, ridging and thinning of the tall, stemmy type might be preferable. The rate of seeding would be from 1 to 1½lb. an acre. Such crops would be best used for cutting and feeding out. Alternatively, where feeding out is not practised the medium leafy type could be grown, the seeding increased from 1½ to 2lb. an acre, and the crop not thinned, though it should be intercultivated.

Quite often a thin sowing of chou moellier is made with swede crops. That is thought to offer protection from attack by white butterfly, and in drier seasons the shade afforded by the taller chou moellier is considered to benefit the swede crop.

When growing chou moellier for sheep feed the usual practice is to sow on the flat in 14in. or 7in. drills, the leafy type being selected for this purpose. Seedings vary from 2 to 4lb. an acre.

Chou moellier is a gross feeder and responds well to heavy manuring, rapid leaf growth being stimulated by the use of nitrogenous ingredients such as blood and bone or sulphate of ammonia. Where small areas of this crop are grown on dairy farms it is the practice to dung the field, but if that is not done, a proprietary turnip or mangold manure containing phosphate, potash, and nitrogen is applied at the rate of 3cwt. or more an acre. A mixture of reverted phosphate and blood and bone sown at the same rate would probably be more effective. Some farmers apply 2cwt. of phosphate an acre before ridging and sow the remainder of the fertiliser mixture with the seed, but when sulphate of ammonia is used it is sown through the front box of the ridger to avoid germination injury.

Irrespective of the type of land and the fertiliser mixture, a liberal amount of fertiliser should be applied, but in such a manner as to prevent seed injury and make the maximum quantity available to the growing crop.

Early Sowing Usual

Chou moellier is usually sown early—from early September to November. The young plants are quite frost hardy and failures from frost injury to the crop are rare. Sown early, the crop has a long period in which to grow, which enables a bulk of feed to be obtained by autumn and early winter. Chou moellier is better used in autumn and early winter as, though relatively hardy, it is defoliated by severe frost. When it is left over for feeding in spring digestive upsets such as red-water are not uncommon.

Therefore it can be said that, whether it is fed to cattle or to sheep, the best use of chou moellier is for late autumn and early winter feed.

A crop grown for feeding to dairy cows is generally cut and fed out, which reduces the loss caused by tramping. Chou moellier is considered a more palatable feed when cut 24 hours before being fed.

Place in Rotation

There is no hard-and-fast rule about where chou moellier should be fitted into a rotation. It can follow any crop which allows of sufficient early spring working, and is often sown after grain crops or autumn-ploughed lea. The general arable practice of any farm governs the rotation followed. A not uncommon one on the heavy arable flats in the south is lea, potatoes, grain, and chou moellier. Alternatively, as

THOUSAND-HEADED KALE AND CHOU MOELLIER

Chou moellier ready for feeding out.

chou moellier is resistant to club root and growing two successive swede crops has always been common, the second swede crop is now frequently replaced by chou moellier. Thus, the rotation may be lea, potatoes, grain, swedes, and chou moellier. The use of chou moellier has been considerably extended by that practice.

On lighter, arable soils chou moellier often follows the grain crop or is the second brassica crop in a rotation following grain. In other instances, where grain cropping is limited or non-existent, chou moellier is sown on lea ground.

Chou Moellier after Cereals

Discing up wheat or barley stubble immediately the crop is off the ground in February and then sowing chou moellier is giving good results in parts of the Manawatu and Rangitikei districts and could be extended with advantage.

Where a spring-sown wheat or barley crop is taken after grass and a second cereal crop is intended, instead of leaving the land idle from the harvest of the first crop until the spring ploughing, the land is got ready for chou moellier as quickly as possible, usually by heavy discing of the stubble, and the fodder crop is sown by the end of February or at the latest early in March. The resulting chou moellier gives a somewhat spindly growth, but the fodder which is available in late June and July is valuable as a flushing crop for ewes before lambing and is also used to top off cull lambs. The ploughed-in refuse from this crop is found to give good results with the second wheat crop, which often gives a better yield than the first.

THOUSAND-HEADED KALE

The chief variety of thousand-headed kale now in use is a selected type produced by the Agronomy Division. The seed is grown under the supervision of the Department of Agriculture and marketed as Government Approved seed.

Soils and Climate

Like chou moellier, thousand-headed kale will produce best on the heavy soils, but this crop is more widely grown on the poorer soils than is chou moellier. Good crops have been grown on the medium clay loams which form a high proportion of New Zealand"s ridge country. The crop will not tolerate soils which tend to become waterlogged. The growing of kale is more confined to the South Island because, as more arable farming is pratised more provision of supplementary feed is necessary, and also because the crop is largely grown by the sheep farmer.

The moisture requirements of the crop are like those for chou moellier, except that there is a decided tendency for kale to encroach on the drier areas. Indeed, thousand-headed kale will stand fair periods of drought and still produce a useful crop of feed. As larger areas are the rule for sheep feed, crops need not be so bulky and a satisfactory crop may not necessarily be high yielding if it is sufficient for the purpose intended. Both young and mature kale are frost hardy, so that the crop is extending into areas of extremely cold winters and frosty springs.

Uses for the Kale Crop

Thousand-headed kale is utilised somewhat differently from chou moellier, and that governs the time of sowing. The crop should be sown early, usually in October in the south. In practically all references to this crop its late maturity is emphasised, though many farmers use a portion of the crop for autumn sheep feed. The plant takes a full 12 months to reach maturity and in the second spring occurs the budding of the lateral shoots, from which the plant derives its name. It is then that most feed is produced. The common practice, however, is to sow early and take the first feeding in February or early March. At that stage a good crop will often be from 3 to 5ft. tall and will stand very heavy feeding.

Though usually considered as a maintenance crop for store sheep and the ewe flock, there is no doubt that in some districts kale is proving quite a satisfactory fattening crop. There is a growing tendency today for this crop to take the place of giant rape, at least in part.

Kale has one attribute which makes it a very worthy crop for autumn feeding: Its ability to recover after grazing at that stage. In that respect it excels all other crops, and, though it will not produce its greatest bulk if grazed in the autumn, it will produce a really good second crop the following spring. On good land kale has been known to produce a third crop in the second autumn. Thousand-headed kale is of importance, therefore, as it can be used at two of the most difficult periods—in the autumn and early spring. In the south August can be a difficult month, and as often as not the first flush of green growth does not appear until later, so that an area of well-matured kale can be of great value at that time.

Where rape and turnips can be grown successfully kale will not replace either, but where they do not give the desired results the use of kale can be recommended. The practice of growing an area of both chou moellier and kale is increasing in the fat lamb areas in the south. In many instances, however, the kale is used not for fattening but as a maintenance crop, and quite often for August and September lambing. But where well-forward milk lambs require a little topping thousand-headed kale is being used successfully in increasing areas.

Cultivation and Sowing

Much the same recommendations as made for the cultivation of chou moellier apply to thousand-headed kale. It has been found a disadvantage to grow either of these crops on late-ploughed lea. By autumn ploughing and early preliminary cultivation a much better disintegration of the turf is obtained, and the disadvantage arising from the air lock caused by the old turf is minimised.

As with chou moellier, especially in the South Island, the practice of using kale as a second crop after turnips is increasing, as kale is not so susceptible to the diseases which attack the root crop. To secure the maximum production it must necessarily occupy the ground for a long period, but it can be used in time for satisfactory subsequent autumn sowing.

Kale can be sown on the flat or on ridges. In heavy land it can be sown on ridges and cultivated in much the same way as swedes. Some farmers put a little kale in the seed when sowing swedes; if the swede crop is grown for the tops, this is a decided advantage and has been found valuable to the stud breeder for putting size and growth on hogget rams.

On the flat kale can be sown in 7 or 14in. drills, depending on the quality of the land. It is better to sow through every second coulter on strong, moist land; on light land subject to dry spells or where rainfall is low it should be sown in 7in. drills. It has been used as a cover crop for sowing out pasture or clover stands, but should not be used thus where it is likely to produce heavy crops; because of the great amount of feeding the kale will stand, the establishing pasture plants would be unduly damaged.

Kale is a heavy-producing crop and like chou moellier should be liberally manured. Intercultivation should be undertaken where the crop is ridged. Both crops are rapid growers on good land, and once they establish a ground cover they are effective in suppressing weeds.

When planning the sowing of either kale or chou moellier where the crops are to be fed in the field and in breaks, the location of the proposed break fence must be considered. If the positions of the fences are determined before sowing, a drill strip or a couple of runs of the ridger should be missed and sown in some other crop, such as swedes. That eliminates the big task of cutting a track through the crop to run out the netting, and gives a better clearance alongside the fence so that there is less tendency for stock to push through the fence to the ungrazed portion.

The rates of seeding an acre suggested for kale are:—

On ridges: 1 to 1½lb.

On the flat in 14in. drills on heavy land: 1½ to 2lb.

On the flat in 7in. drills on medium land: 2 to 2½lb.

On the flat in 7in. drills on light, dry land: 3 to 4lb.

For mixtures in 7in. or 14in. drills or broadcast a lighter seeding is recommended.

Manurial treatment should be liberal. Usually 3cwt. of a turnip mixture containing reverted superphosphate, blood and bone, and some potassic fertiliser is applied.

Harvesting in England

In English wartime agriculture the area devoted to home-grown feedstuffs was of necessity greatly increased, and the kales figured largely in that increase. Attention given to the crop was similar to that in New Zealand, but with the shortage of labour cutting and feeding out were decidedly a problem. It was overcome in some instances by the mechanisation of cutting and carrying. The mower has been used in New Zealand, but in England that was taken a stage further by the use of the "cutlift," a machine used for handling green grass in the early days of grass drying, and it was found possible to cut and pick up a load of 15cwt. in 5 minutes. Such mechanisation might well be the last resort where labour is scarce in the Dominion.

A good crop of kale ready for feeding out.

Disadvantages common to both kale and chou moellier are the damage caused to wool by the stalks and the wetting of the backs of lambs grazing on the crop in wet weather. Both crops are difficult to handle after sheep grazing, as the stalks present a problem when ploughing, but that can be mitigated largely by following up with cattle after the sheep. However, the advantages outweigh these to such an extent that the number of regular growers of both crops is gradually increasing.

Both crops are more resistant to root and leaf pests than turnip, swede, or rape; chou moellier is considered to be the better in this respect. Club root affects neither. White butterfly and diamond-backed moth both attack them, but not too readily. Aphis attack is usually confined to weakly crops or to crops in the early flowering stage.

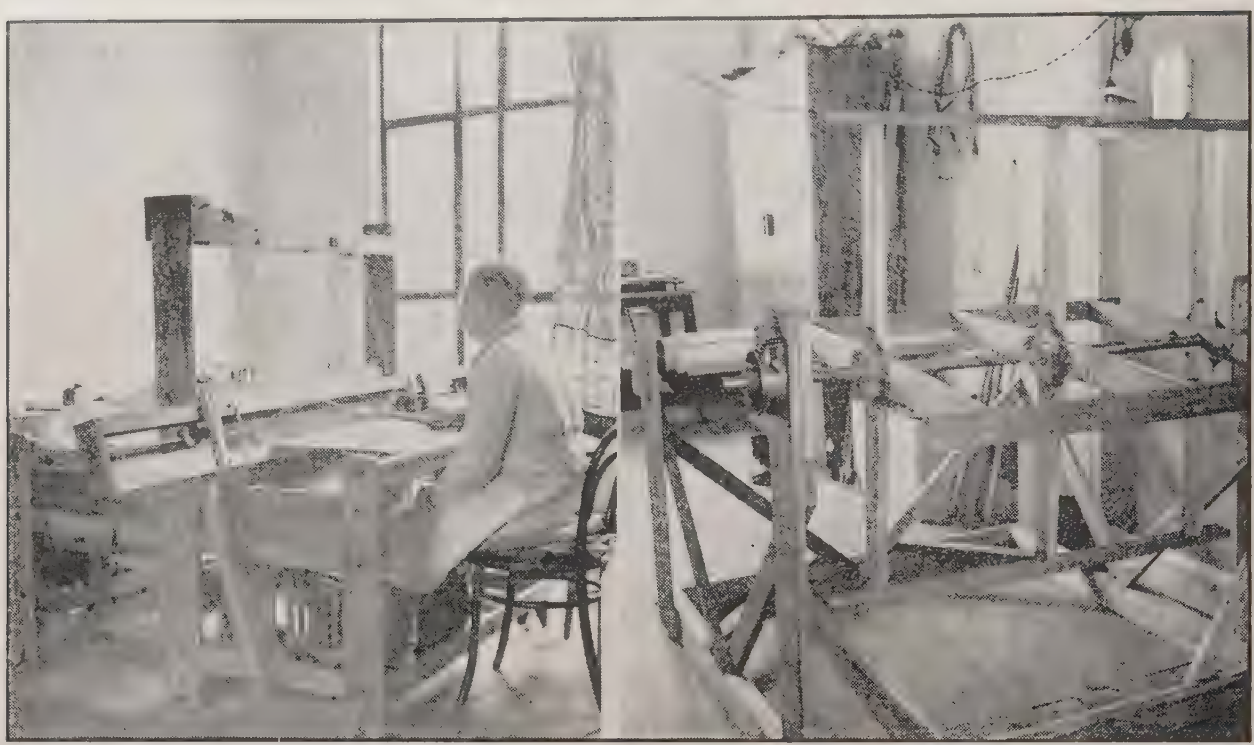
Summary

All factors considered, it can well be said that the kales are a valuable addition to the fodder crops grown in New Zealand—indeed, the increasing areas being grown would indicate that they may receive still further recognition in the next few years. The choice of crop will be based on several factors, the main ones being the locality, and when and for what purpose the fodder is required.

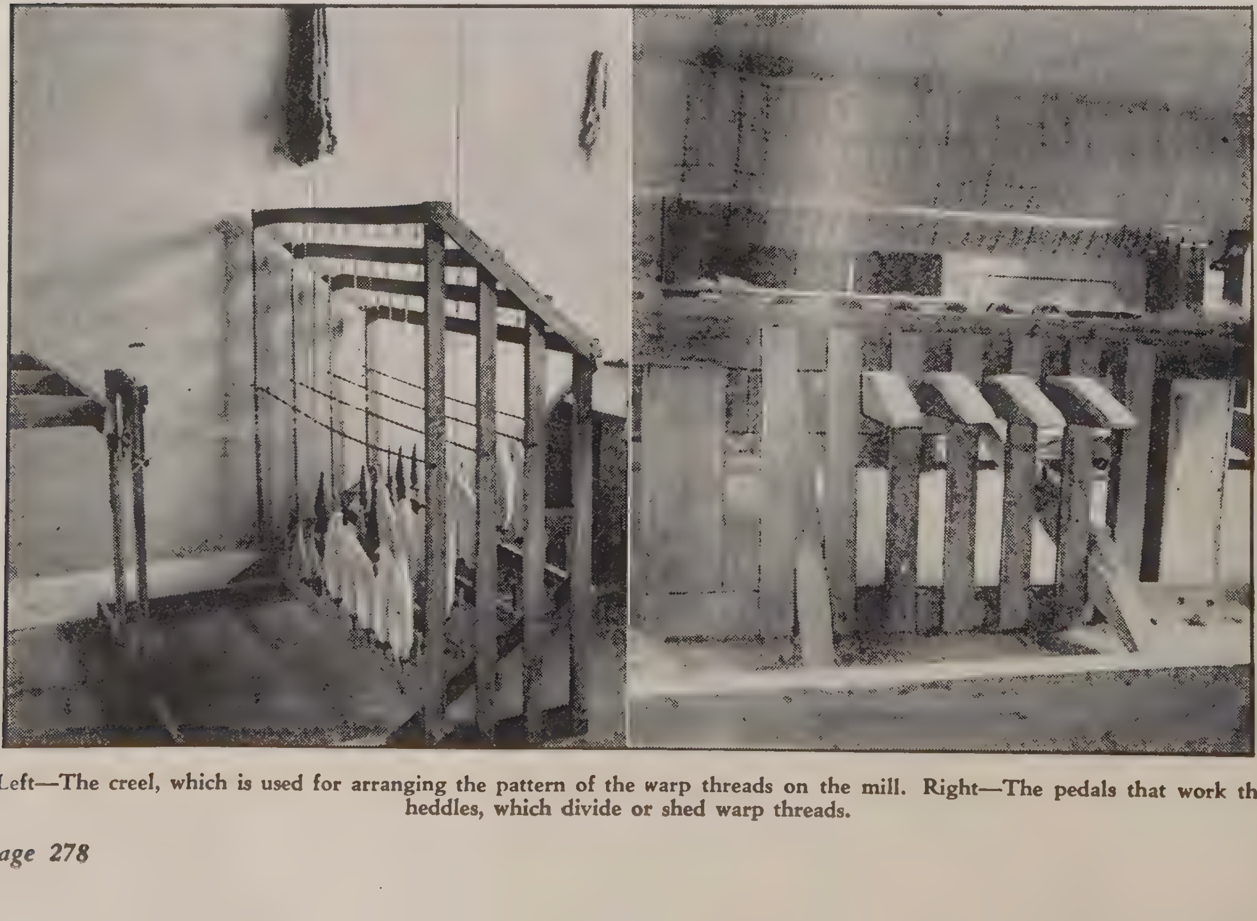
Chou moellier will be first choice with the dairy farmer for late autumn and early winter feed. Both chou moellier and kale will probably be used by sheep farmers: Chou moellier, with its greater palatability in the early stages, for autumn and early winter, and kale, with its later palatability and frost-hardy nature, for early spring grazing.

Kale will be used increasingly in both autumn and spring, as it is without peer for recovering after grazing and is now being used successfully as a two-period crop in many localities. In Otago at least it has proved to be a reasonable fattening feed on land where rape cannot be grown successfully.

MAKING OF HAND-WOVEN CLOTH BY SERVICEMEN



Left—One of the three hand-made looms. Right—The warping mill. Threads are transferred on to the beam at the back in the correct pattern for weaving.



Left—The creel, which is used for arranging the pattern of the warp threads on the mill. Right—The pedals that work the heddles, which divide or shed warp threads.

MAKING HAND-WOVEN TWEEDS

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Work at Disabled Servicemen's Training Centre

POPULAR demand for the paua shell ornaments, polished-wood articles, and furniture made by the Disabled Servicemen's League has caused the league's work to become widely known. A comparatively new venture of the Napier branch of the league—the weaving of yarn into cloth for suits, costumes, sports coats, and other clothing—promises not only to become equally as popular, but to provide a useful avenue of employment for the Dominion's disabled servicemen if certain difficulties can be overcome. The work of this weaving section is described in this article by H. R. Lusk, Assistant Wool Instructor, Livestock Division, Wellington, who discusses the difficulties with which the section is faced.

THE Disabled Servicemen's League provides trade training facilities for ex-servicemen who, through war wounds, are 40 per cent. or more disabled and are therefore unfit for hard manual labour. The men are taught trades in the training centres of the league and when they have mastered the trade they have selected they are encouraged, with the help of the Rehabilitation Department, to follow the trade on their own.

In the hand-weaving section at the Napier branch of the league all the apparatus—three hand looms, loom parts, and the warping mill and creel, which are used to make the pattern of the warp threads and wind them on to a beam for use in the loom—were all made in the section by Mr. W. Brady, a returned soldier from the First World War. Mr. Brady, who is a panelbeater by trade, had no blueprints as a guide in building the machines and he spent many of his free hours experimenting before he completed them.

At first the section employed an instructor to teach the trainees the weaver's craft, but later one of the trainees, who showed exceptional ability, took over the instructional work.

Types of Cloth

As the section has only three looms, the supply of finished cloth is not great. When all three looms are in operation the amount woven is up to 90 yards of material, or about 3 bolts, a week. The yarn is woven into different tweeds and various patterns of tweed, and the finished material compares very favourably with the machine-woven fabrics produced by New Zealand woollen mills. The yarn is bought from the Wanganui Woollen Mills and consists mainly of medium to coarse wool, which makes up into various tweeds of different colours and designs for men's sports coats, overcoats, suits, and women's wear. Worsteds have not been attempted yet, but these could be produced if other parts for the looms and suitable yarn were available.

Cloth Finishing

As the weaving section is concerned only with the conversion of yarn into cloth at present, washing, milling, and finishing are done by the Napier Woollen Mills. The cloth is washed to remove dirt and oil gathered in the weaving, and is milled and shrunk to a standard width. The milling process causes the wool fibres in the cloth to interlace and the material becomes denser. It is then steam pressed and rolled to become the finished cloth.

Distribution of Stock

As they are finished the bolts of cloth are distributed around the branches of the league and are sold to the public in the lengths they require. The Napier branch could sell much more cloth if its supply was greater, as there is a considerable demand in the town. The policy of the league, however, is to distribute its wares as evenly as possible among its branches, and so advertise throughout New Zealand the work its tradesmen are doing.

Difficulties to be Overcome

In any new venture difficulties are certain to be met, and the league has problems to face. Because entry to the training centre is restricted to men who are 40 per cent. or more disabled, the number of trainees is limited. Furthermore, when trainees are considered to have learnt their trade they must leave the training centre to undertake work for themselves. This causes breaks in the continuity of supply from the time trained men leave to the time fresh trainees arrive. However, this difficulty will be overcome, because the quantity of cloth produced for sale by the branches will be gradually increased as more men are set up on their own by the Rehabilitation Department. The Napier branch now employs a field officer who travels around the country interviewing disabled men to persuade them to take up this work.

The most serious difficulty is the obtaining of a continuous supply of yarn. Because the yarn which is bought from the mills is yarn which the mills are producing for their own requirements, the quantity made available to any outside firm is naturally restricted. The mills buy only enough raw wool in a season to supply themselves with yarn, and small orders given at irregular intervals are hard to fill.

Therapeutic Benefits

Hand loom weaving is fascinating work, and seeing the pattern slowly taking shape in the cloth gives one a satisfying sense of achievement. This was the means of completely curing two men who undertook training in the Napier centre recently.

One man had completely lost the use of one hand and had been classified by the Medical Board as unfit for any hard manual work. He was encouraged to work on the looms and became so interested that he gradually started using his hand again, and has since been able to take up other work.

The second man's case was more amazing. Having lost the use of the muscles of one leg, he had gone to the training centre to learn a trade. In operating the hand looms it was necessary for him to use pedals under the loom to part the warp yarn for the insertion of the weft yarn. He found the work so absorbing that he overcame his disability by constant practice on the foot pedals. His recovery has been so complete that he has been accepted for service in Japan with J-Force.

Future of the Work

There is no doubt that if more of the Napier branch's cloth could be produced, an excellent market could be established. However, keenness of demand is not the only requirement to ensure the success of the project. The difficulty in purchasing a sufficient supply of different types of yarn may turn this avenue of employment for the Dominion's disabled servicemen from a trade by which they can make a living into a part-time hobby which they cannot afford to have.

At the time of writing there seems to be no solution to the problem of where the training centre can purchase the yarn when it is required, although the Wanganui Woollen Mills are assisting as far as possible. The writer is confident, however, that a way will be found eventually.

In the meantime small quantities of cloth are being produced each week, and those visiting Napier should, if possible, visit the centre and see the type of work being carried out.

REGISTRATION OF

DAIRY FACTORY MANAGERS

Intending applicants are hereby notified that applications for registration under the Dairy Factory Managers' Regulations should reach the Registrar, Dairy Factory Managers' Registration Board, c/o Department of Agriculture, P.O. Box 3004, Wellington, on or before 1st May, 1947. Forms are available from the Registrar.

Attention is drawn to the fact that under the Regulations, any application which is received by the Board after the 1st May, 1947, shall not, except in special circumstances, be considered by the Board until after 1st May, 1948.

E. M. EDGECOMBE, *Registrar.*

N.B.—*This notice refers to persons who are NOT AT PRESENT HOLDERS OF CERTIFICATES. Notice of renewal and renewal form will be posted to every registered manager by the Registrar.*

Stock Remedies Act Amended

THE law governing the sale of stock remedies has been in operation since 1934. Its principal feature is that a preparation may not be sold, offered, or advertised for sale for general use as a stock remedy unless it is registered by the Stock Remedies Registration Board set up under the Stock Remedies Act, 1934. In the course of administration certain defects have been found in the Act, and the purpose of the Stock Remedies Amendment Act, 1946, is to remove those defects, thus providing further protection to the farming community against the purchase and use of unsatisfactory preparations.

The amending Act alters the law as follows:—

1. To empower standards of quality, purity, strength, weight, or quantity of a stock remedy or any ingredient or component of a stock remedy to be prescribed by regulations.
2. To make it an offence to sell a registered stock remedy the composition of which differs materially from that lodged with the regulation board at the time of registration of the remedy
3. To empower the registration board to refuse registration of a stock remedy which, in view of its composition and the purpose for which it is intended to be used, is in the opinion of the board of no value; or does not comply with any standard specifications for the preparation laid down by regulations under the Act.

So that the additional powers may be available to the board for the reregistration of stock remedies, the triennial reregistration has been postponed until September 30, 1947.

FARMING IN ETHIOPIA

Almost Unbelievably Backward But Capable of Great Expansion

By C. S. M. HOPKIRK, D.V.Sc.

[*Dr. Hopkirk was superintendent of the Animal Research Station, Wallaceville, for many years. He resigned in 1945 to accept an appointment with UNRRA.*]

DURING my stay in Ethiopia, which I reached by air on October 23, 1946, I have had an opportunity of seeing a great deal of the agriculture of the country. Naturally it is backward, but far more so than I expected. Under Italian rule, short as it was, an effort was made to understand the country, introduce education, make roads, and settle Italians on the land in increasing numbers. A start was made to improve agriculture to meet the needs of a European population. Had that settlement been legitimate and at one with the wishes of the people, Ethiopia would today have been well on the way to being a prominent African nation, but the oppression brought about by the Italian leaders offset all the good intentions and left Ethiopia worse off than she originally was.

THE intellectual families of a nation cannot be eliminated and the royal family cannot live for years out of touch with the country without degeneration of the moral tone of the people. It says much for the influence of the royal family that Ethiopia is again aspiring to better living and shows a desire for education and improvement. However, with limited funds the process will be slow, but progress would appear to be sure in that the health and education of the people are being improved at increasing speed.

Assistance is being given by various nations, and that may keep a balance in the country between foreigners. Swedish, American, British, Russian, and Swiss influences are all obvious; each nation is assisting where possible. Missionary activities, as long as they persist in education and hospital work, will do great good in backward areas, but I hesitate to assume that it will be for the good of the nation to see different Christian sects arise when there is already a strong orthodox Coptic Church.

A dried river-bed in typical country in south-east Ethiopia.

Benefits of Education

Education is already noticeably improving the young people. There is no spectacular art to be seen in Ethiopia, yet the girls in schools in Addis Ababa and in missionary schools have been extraordinarily quick to pick up household handicrafts. Their needlework and basketwork are good and the students most apt in picking up patterns—and, indeed, in forming their own patterns.

In agricultural schools, of which there are several, the boys are learning the value of proper use of the soil and of new seeds for vegetable, cereal, and fruit growing. They enjoy good work with more suitable gardening tools and with tractors and ploughs, and that will go far toward teaching them better nutritional ideas. The students are learning, too, the comfort of sleeping in clean beds, of general cleanliness, of better clothes, and the joy of beneficially occupying time which was often used to very little advantage. They will return to villages all over the empire to inspire their kinsfolk with their new ideals.

In secondary schools, too, they learn quickly, and it will not be long before a new generation has arisen filled with new ideals, loving freedom, and able to communicate without language bar with much of the rest of the world. It is to this younger generation that we must look to bring Ethiopia into world councils without suspicion and with an honest voice in world affairs.

Climate and Clothing

The topography makes Ethiopia an easy country in which to live. Though the country is near the Equator, the climate is on the whole temperate because of the height of the plateaux. Lack of water in quantity is the greatest drawback, for with water there would be scarcely any desert. The erosion of centuries during the wet season has been so great that the desert fringing the high centres is made up of rich soils which with water show their fertility. That is evidenced at the Emperor's citrus farm at Errer, where growth is phenomenal because of the benefit of a large spring and small river, while the surrounding country is arid, growing only thornbush and other desert plants. Excessive water has its drawbacks in such a country, for tropical growth occurs easily and with it abound jungle creatures, the malarial mosquito, and disease, but under modern methods of control and sanitation those can be overcome and habitation made comparatively safe.

Forms of agriculture, climate, and lack of trade facilities and handicrafts are reflected in the clothing of the common people. Agriculture differs widely from one part of the empire to the other. In semi-arid and arid desert areas nomads travel in search of sufficient feed for camels, goats, and sheep. Barefoot, as all country and many town natives are, clothed in white or grey cotton garments, depending on the state of cleanliness, or in skins of goats, sheep, or wild animals, women with bead necklaces, carrying small children on their backs as do the Maoris and plodding along with their grazing stock, the nomad is always picturesque. The men, heavily

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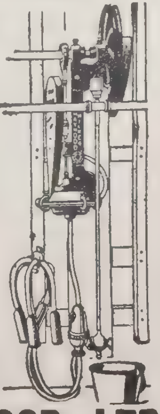

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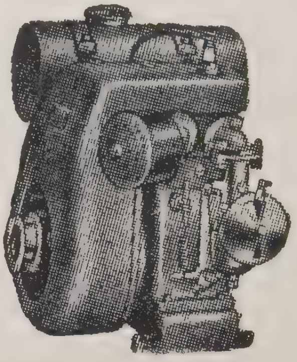

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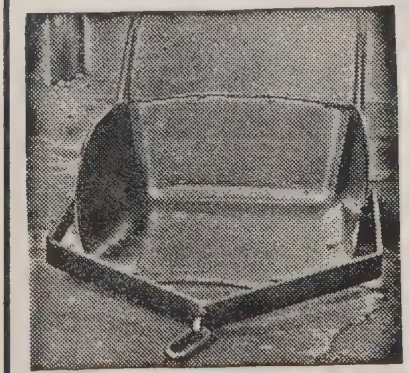

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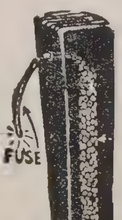

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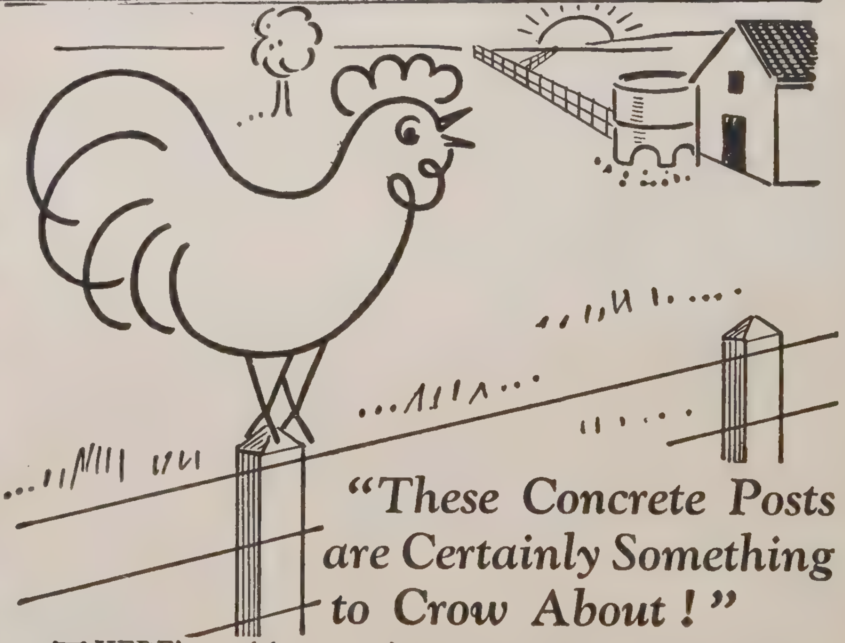

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armed for the protection of their riches—families and livestock—lightly bearded, and spare in frame, give the impression of ruthless power should the need arise. They live in skin tents while on the move and grass huts if they settle for any time where grazing is good. The camps serve the double purpose of dwelling and protection for stock; walls of thornbush skilfully piled form a useful fence to guard stock at night from thieves and wild animals.

Diet too Starchy

The Ethiopian peasant does not have a great variety of food. He makes a rubber-like bread, injera, from teff, or a maize loaf in which is incorporated berbera, the pepper of the country, which with salt has always been a national necessity. Meat in the form of chicken, kid, or lamb is a common dish, but often slices of raw beef are eaten, cut off at the mouth by knife and eaten as warm as possible. Eggs and milk are not used as widely as could be wished. Where goat's milk is in use, as it is round Lake Awusa, the teeth and general physique of the people are very good. Fruit and vegetables are eaten when available, but are not generally grown for food.

On the whole the food is not varied enough and is too starchy. That arises from the fact that there are so many fast days: Wednesday and Friday of each week are fast days, and 110 other days a year are given up for such occasions as Lent and Christmas. On fast days no animal protein food may be eaten, nor may any food be eaten that is collected on a fast day. That greatly reduces the protein diet of the nation, among Copts at any rate.

It is said that fast days are very noticeable in schools, where the children reflect the lack of good protein food by inattentiveness and lack of energy. However, religious observances are notoriously difficult to counteract until the Church itself takes the lead.

Village Life

In the richer agricultural areas where the natives have settled into permanent existence they have congregated into villages, each family to its own hut and each small flock enclosed round that hut within the village. The "tukul" (hut) is picturesque but cheaply and easily built of poles latticed together in a circle, with a heavy grass thatched roof and a door which can be closed. Food is cooked over a central inside fire of dung and straw cake or, if wood is plentiful, over wood or charcoal. Smoke drifts out through the roof.

Furniture is non-existent in most huts, though some natives have made stretchers. Each hut has its wooden mortar for grinding cereals and basket for keeping grain. Water is kept in earthenware crocks of 3 to 4 gallons capacity, which can just be carried by women, who spend much of their time going miles for water for family use. However, a donkey is often employed for this purpose, saddled with a pannier, and where army water cans or petrol tins have been obtained the crock has been superseded. The weight that women can carry on the small of their backs, assisted by a head strap, or on their heads, is amazing—great loads of wood, crocks of water, skins of cereal, flour, or honey. If they are travelling, each often carries a gourd for drinking water or a bottle or gourd of oil for cooking.

Crops and Grazing

Probably for protection, tukuls are not built on the area of ground farmed, but are put up in clusters. The farming ground surrounds the huts, and there is grown whatever cereal suits the climate. Teff, barley, maize, or dhura are common, but other crops require more water. When that is available bananas, oranges, mandarins, yams, taro, and perhaps coffee may be grown. Many villages grow a banana-like plant which yields fibre, and from it rope is made. Villagers like tedge, a honey mead, and tala, a native beer, to drink; some have learned to smoke tobacco and may even grow a little.

Round villages there is also a certain amount of grazing land for the stock —donkeys, cattle, sheep, goats—but the pasture is poor, with clovers noticeably absent, and grazing is haphazard. No crop is grown for stock, though lucerne would do well in many places. The value of the grazing is reflected in the size of the cattle.

In the tropical parts of the country —below Jimma for instance—coffee, tea, quinine, and fruits can be grown, again particularly where irrigation is possible. Very good coffee can be grown in Ethiopia, which, after all, is the home of coffee.

Cattle the Main Stock

The main stock of Ethiopia is cattle, of which there are at least 15,000,000 with an annual death rate of at least 1,000,000. All are of zebu type, differing in size and colour, but all humped and fairly disease resistant. At Gondar, in the Aroussi province, and round Harar many cattle are of commendable size and could be used for beef production.

Apart from the sale of hides no great use appears to be made of cattle, though no doubt they are used for barter. Big weekly sales do occur in places such as Hadama, when 10,000 head may accumulate and change hands, but Hadama is a crossroad. These cattle are not milk producing and have barely enough milk to feed the calf.

With the cattle are usually seen sheep and goats to swell the wealth of the farmer. The sheep are all of a fat-tailed variety, multi-coloured, use being made of the black, tan, brown, and white wool for some clothing, blankets, and capes, for which the weaving is done by the women. However, the wool is very coarse, best for mat and carpet making, a little of which is done.

Goats appear to have little use, though they produce quite a lot of milk at times. Very little sheep or goat cheese is made, in contrast to practice in European countries.

Pigs are not usually bred by the natives because of a religious bias; their breeding is left to Europeans for their own use.

There is no incentive for improvement of stock in Ethiopia, for there is little outlet. With selection, excellent beef herds could be bred, but with what object? There are no export slaughterhouses or canneries, and only a few tanneries.

Lack of Sanitation

Beef is eaten raw in long strips by many of the natives, and, as beef measles is a common disease of the cattle, the peasant has to purge himself once a month to get rid of the tapeworms which result from eating measly beef. This vicious cycle of human tapeworm and cattle cyst reflects the complete lack of sanitation of the people—something which education will teach them to improve.

The introduction of D.D.T. to control the mosquito, and some education on control of venereal disease, will go far to improve the general health of the people. With the assistance of the medical services of various nations and of UNRRA health authorities are now training sanitary inspectors with these objects in view.

Transport an Urgent Need

The backwardness of agriculture and of the life of the people has been shown. What advice can be given to hasten an improvement in conditions? It may be said at once that roads and railways are required now that education has begun. The natural wealth of the country—gold, platinum, metals, and oil—cannot be reached and developed intensively without roads and railways from them to the coast. The country cannot afford to continue in a state of indolence if it wishes to enter world affairs instead of looking on from the sidelines.

FARMING IN ETHIOPIA . . .

Obviously outside monetary assistance is necessary, and the excessive caution with which offers of assistance are encountered should be overcome. High-class specialists are required, and foreign capital would soon add greatly to the wealth of Ethiopia. Without road and motor transport, nothing can be accomplished.

Better Farming Methods Essential

With the mineral and oil wealth of the country practically untapped, agriculture takes precedence. Just how backward agricultural methods are is almost unbelievable without a realisation of the isolationist policy which has always been adopted and which has yet to be overcome for the good of the country. Enormous wealth can be extracted from the rich soil of Ethiopia, but not by present methods.

Experimental stations imbued with the idea of finding better pasture grasses, better cereal crops, and far better methods of production are very necessary. A start has certainly been made at agricultural schools, and the gift by UNRRA of vegetable seeds unknown in Ethiopia is very valuable, for variation in food plants is poor. By more liming and topdressing, and ploughing-in of green crops, pastures can be made to carry many more stock, but it would seem futile to introduce better-class stock until feed conditions improve.

However, experimental breeding by selection of animals in the country can and should be started and judicious importation of milk breeds should also be attempted in preparation for the day when public opinion demands milk for the health of the children of the nation. That will come with sanitation and improved nutrition.

Control of Stock Disease

The health of the livestock of Ethiopia would be good if epizootic diseases could be eliminated. That requires a strong veterinary and laboratory service. Epizootics are not only uneconomic in Ethiopia, but constitute a danger to Africa and Europe in these days of fast travel, and other countries look askance at such a reservoir of disease.

With control of disease a big export trade can develop in animal produce, an export which is required by southern European countries and Arabia—markets which will be lost if an effort is not made to capture the trade. Much protein food is required in Greece and Italy, and Ethiopia is the logical and potential producing country. Foreign capital should be invited to put up and staff packing houses, to can and later to freeze the meat for which Europe is crying out.

Forestry and irrigation also must not be overlooked; they must form part of the far-reaching agricultural policy of the empire.

Ten to 20 years must pass before Ethiopian graduates from European universities can control their own industry and production, but it can be done. With that end in view, overseas bursaries to the proper universities must be made available. It would be a shortsighted policy for the Government to refuse the present help of foreign personnel.

Are Your Conditions Suitable For Lucerne?

By the Fields Division.

THE area of lucerne in the Dominion has increased over the last 10 years by about 1000 acres annually. In 1932 approximately 32,000 acres were grown, the distribution being about equal in the North and the South Islands. By the 1942-43 season the area had increased to 42,842 acres, with only 13,600 acres, or 32 per cent., in the North Island, while Canterbury and Otago, with over 25,000 acres, had 60 per cent. of the total area.

The present downward trend in the North Island is due to the more favourable conditions for grass, and the less favourable conditions for harvesting the different cuts of the lucerne. In the North grass is the worst enemy of lucerne, and usually invades the stand as consolidation of the ground takes place. Lucerne often chokes out weeds such as Californian thistle, but grass more frequently chokes out lucerne, particularly in the North Island, where mild conditions allow considerable grass growth during the winter when lucerne is dormant. Some farmers grow lucerne even under such conditions, because the crop will often last for several years without any cultivation before it is necessary to replough.

In the South Island, where grass growth is less vigorous and climatic conditions more extreme, lucerne will often last longer with less grass competition. In the south this crop is more necessary and valuable in view of the heavy hay requirements for winter feeding, as well as for greenfeed when pastures are parched in a dry summer-autumn period. From 5 per cent. to 10 per cent. of the area of an average-sized farm, under good lucerne conditions, could be profitably handled. As each cut of lucerne needs to be made at a definite period of growth, weather conditions for harvesting are most important, but the moist climate of the North is less reliable and generally more unsuitable than that experienced in the South.

Good Drainage Essential

Lucerne can be grown under a fairly wide range of conditions, but thrives best on rich alluvial flats. The paddock for lucerne should have free natural drainage and be sufficiently fertile, friable, and free from weeds, particularly those of a twitchy nature. Good drainage is absolutely essential to success. Stagnant water will invariably ruin a stand in a very short time, although flood waters that are moving will have little effect. Lucerne bears out the point that irrigation and drainage go hand in hand. Ground that has an impervious subsoil is unsuitable for lucerne, as the roots cannot penetrate, and the drainage will be inadequate. Such a soil is more suited to red clover or permanent pasture, especially in a moist climate. On the other hand, a light, thin, shingly soil of low fertility, with a too open subsoil, is also unsuitable. The higher the fertility the greater the production possible.

Lucerne requires summer heat, but is little affected by winter cold, and, if drainage is satisfactory, it may also thrive under high or low rainfall conditions, when once established.

When preparing a seed-bed the land must be clean for sowing, as lucerne is weakly in the early stages. Arrange ploughing as soon as possible, bury all surface weed seeds thoroughly, and make use of the cultivator to bring twitch roots to the surface for collecting and burning. Harrow to a fine, firm seed-bed, destroying germinating weed seeds periodically over the last few weeks before sowing.

SHOW DATES

THE following are dates and venues of A. and P. shows in April, May and June:—

April 7—Mackenzie Country Highland Show at Fairlie.

April 7—Strath Taieri at Middlemarch.

April 12—Oxford A. and P. at Oxford.

May 30, May 31, June 2, June 3, June 4—Otago A. and P. Society's Winter Show at Dunedin.

June 20, June 21—Rotorua at Rotorua.

Recovering Beeswax from Cappings and Old Combs

By L. H. JOHNSON, *Apiary Instructor, Palmerston North.*

MORE time and money has been spent in endeavouring to invent an appliance to secure honey from cappings without discolouring it or injuring the flavour than on any other appliance used in the honey-extracting house. Of the three methods used, pressing, centrifugal force, and heat, the last appeals to the majority of beekeepers because it not only recovers more honey than the other methods but at the same time secures practically all the beeswax in a marketable condition without double handling.

A MELTER designed and operated by Mr. E. J. Kirk, Wanganui, is illustrated in Figs. 1 and 2. It has some commendable features, two of which are top heat and a water-jacketed box electrically heated and under thermostatic control. The drawings show a modification of the same melter, the capacity of which has been increased to hold the cappings from a ton of extracted honey.

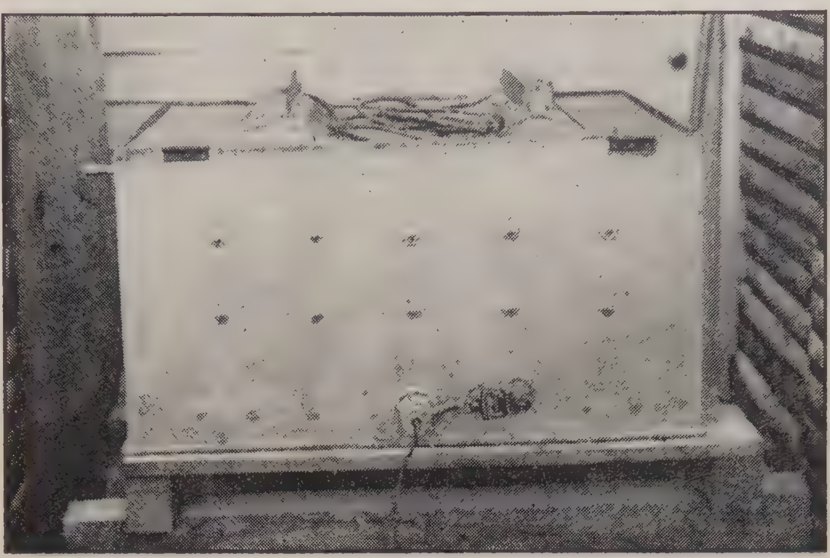
Details of Construction

The material used in the uncapping box is tinned copper sheet metal. Double-walled bottom and sides 1in. apart provide a space for water. A better distribution of heat is obtained by water than by other means. Inside dimensions of the melter are 5ft. x 2ft. (Fig. 3). The floor has a two-way slope toward the outlet to facilitate quick draining off of the honey. The fall is 1in. from back to front and 3in. from the ends to the centre.

The underside of the bottom should be carried through level from front to back at a width of 3in. to provide a space for the electric element at the lowest point. A plug should be provided so that the water can be drained off when the appliance is not in use. The bottom and walls should be well studded to keep them 1in. apart and prevent sagging or bulging.

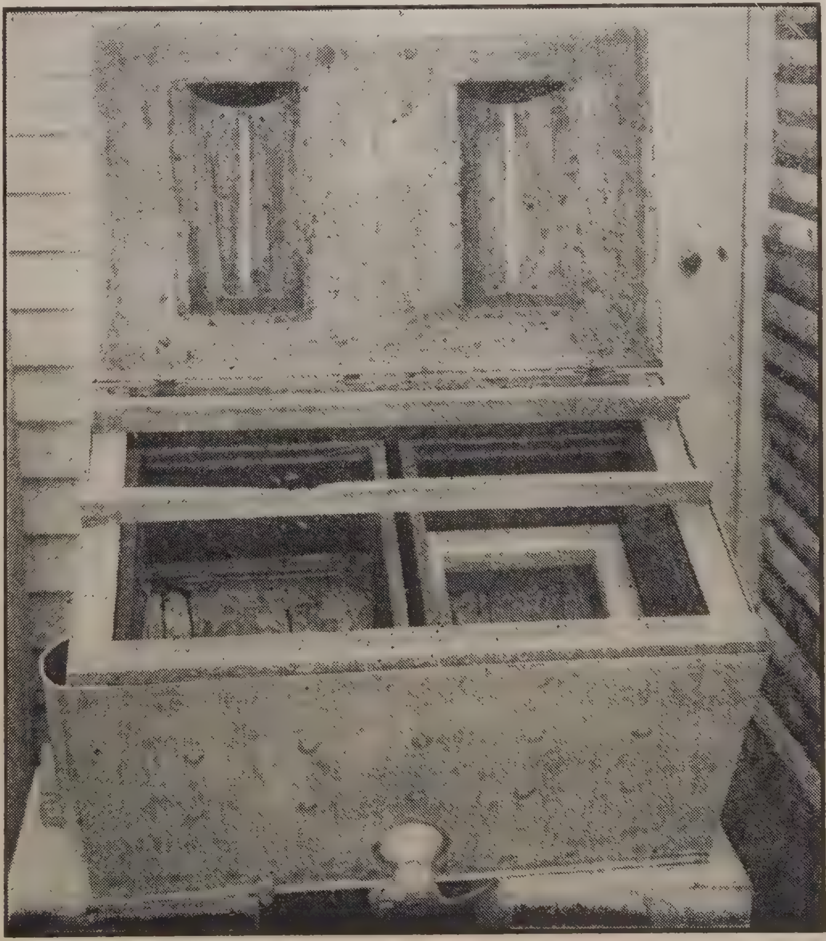
Heating Elements

A 600-watt electric element for bottom heat is fixed in the centre as illustrated. Top heat is provided for by fixing under the lid two 500-watt electric elements controlled by a thermostat, which should be set to operate at 200 degrees. **The lower thermostat controlling the water temperature is set at 140 degrees.**



[*Tesla Studios photo.*

Fig. 1.—Rear view of melter showing electric element and thermostat.



[*Tesla Studios photo.*

Fig. 2—Capping melter with lid raised.

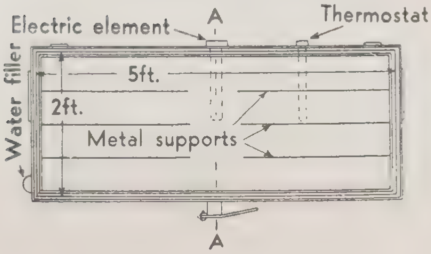

Electric element
A
Thermostat
Water filler
5ft.
2ft.
Metal supports
A

FIG. 3

PLAN OF CAPPING MELTER

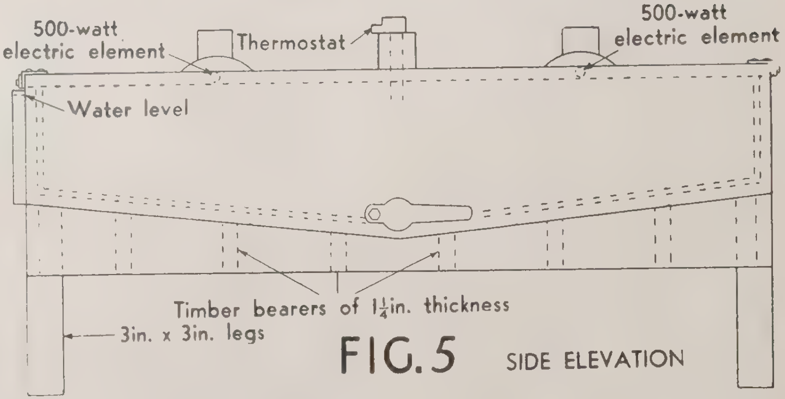
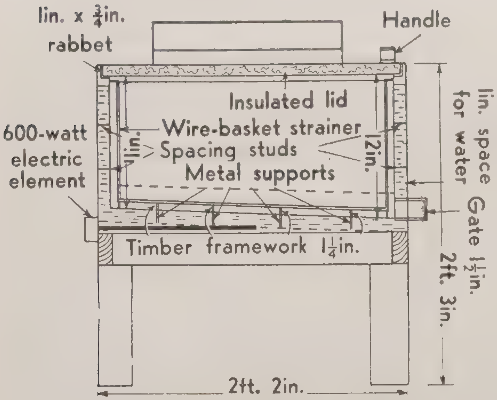

500-watt electric element
Thermostat
500-watt electric element
Water level
Timber bearers of 1¼in. thickness
3in. x 3in. legs

FIG. 5 SIDE ELEVATION


1in. x ¾in. rabbet
Handle
Insulated lid
600-watt electric element
Wire-basket strainer
Spacing studs
Metal supports
11in.
12in.
1in. space for water
Gate 1½in.
Timber framework 1¼in.
2ft. 3in.
2ft. 2in.

END ELEVATION SECTION THROUGH A A

FIG. 4

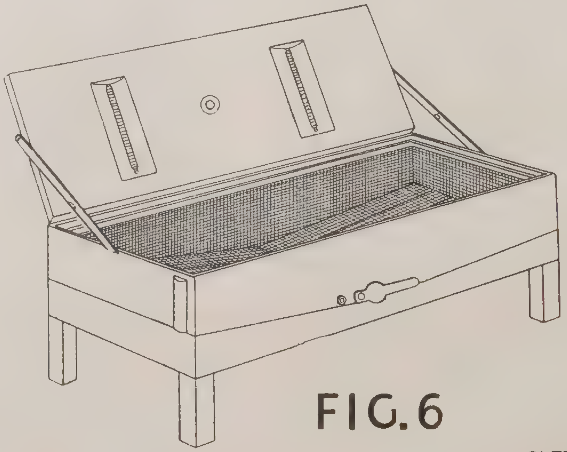


FIG. 6

PERSPECTIVE VIEW OF CAPPING MELTER

An alternative method of providing top heat is to construct the lid of double walls similar to the bottom and sides to hold water, and insert an electric element, which may operate at boiling point.

The Strainer

A framework of wire mesh to support the strainer should be made the same shape as the bottom and ½in. smaller than the inside measurements of the uncapping box. The metal supports shown in Figs. 3 and 4 are to provide a drainage space under the strainer. Another suitable basket for the strainer may be made by constructing an oblong metal box of tinned plate the same size and shape as the wire mesh one, and drilling ⅜in. holes 1in. apart. Having a flat surface, it is much easier to clean than the wire mesh. Cheesecloth, scrim, or wire gauze makes a suitable strainer to cover the bottom and walls of the basket.

A wooden frame with a crossbar on which to rest the frame of honey while uncapping it should be made to fit not only in the rebate which is seen when the lid is raised, but also over the top edge of the strainer to prevent cappings falling outside the basket area.

It is important that the honey gate be built in slightly below the bottom so that there is no possibility of honey lodging there and later becoming a source of contamination.

The capping melter should be supported at a convenient height on a wooden framework of timber 1¼in. thick with cross bearers and 3in. x 3in. legs.

Method of Operation

The wooden frame is placed in position resting on the rebate. Water is poured in the filler until the jacket is full and the 600-watt element at the bottom switched on. Combs of honey are uncapped directly into the basket until it is full. The lid is then closed and the top elements switched on. Do not leave the cappings to drain free of honey without the heat, as they would settle down tightly. Honey will separate from "wet" cappings much more readily when heat is applied.

The honey will run out first, and toward the last good clean wax will come away. It may be hastened by turning the bottom thermostat up a few degrees. Usually the dregs of the honey, about 2lb., will be slightly darkened and should not be mixed in with the rest. A melter full of cappings will yield about 30lb. of beeswax. The slumgum should be removed while it is hot and all of it saved.

Before using the melter again it is important to scrub and wash it clean, or a typical "capping melter flavour" will be imparted to the honey.

This melter will obtain in one operation the maximum of honey and beeswax in good condition. The beekeeper who has skill and tools will find no difficulty in making a melter of this design, thereby saving several pounds.

Wax from Old Combs

Though the bulk of wax is usually secured from cappings by some type of capping melter, large quantities are obtained from old combs by different methods. Of all the methods used by beekeepers for this purpose the Hatch press appears to be the most efficient in general use.

Experience has taught some beekeepers that is it wise to erect a separate building for wax rendering a little distance from the main building to minimise the fire hazard. Pressing can be done satisfactorily only in a warm room, and as this is usually a winter job outside wax rendering should not be considered.

A small building with a concrete floor 8ft. x 10ft. should be satisfactory. Electric light and water laid on over the capper are a distinct advantage.

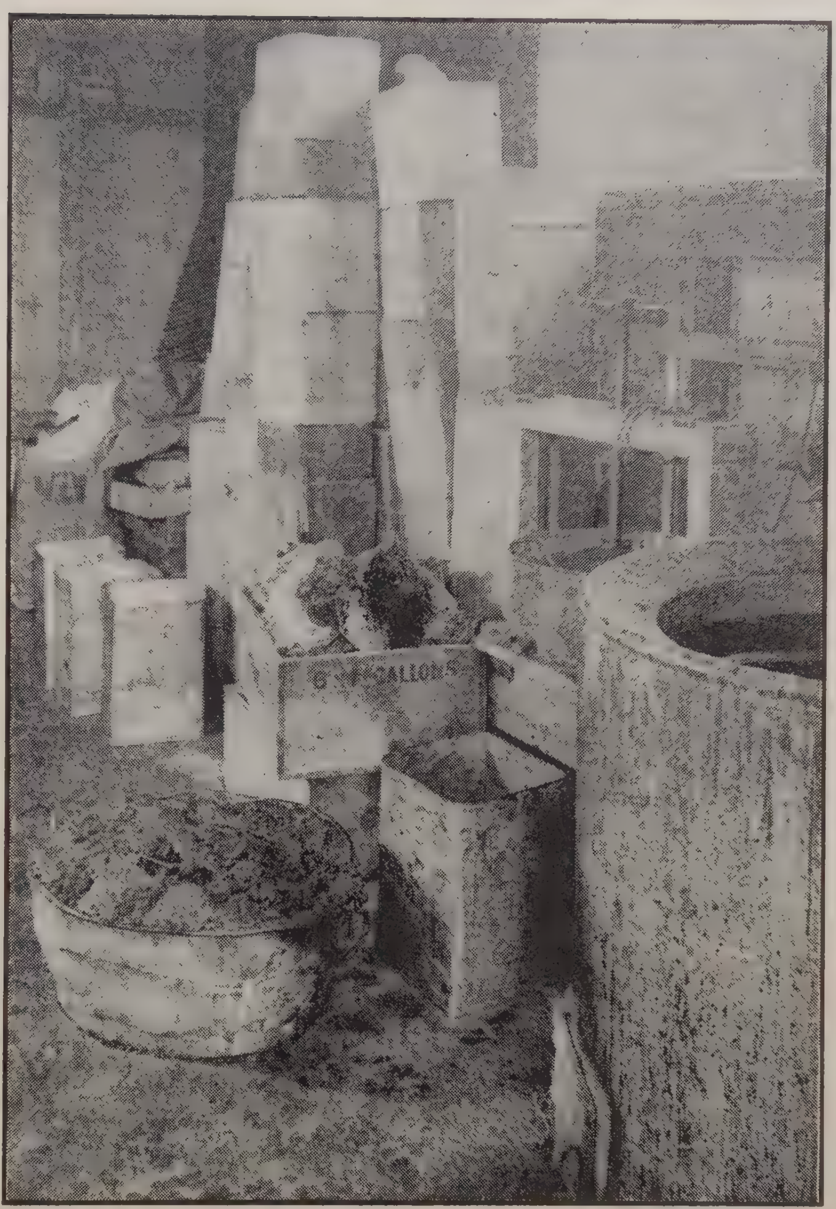
The plant and layout in Fig. 7 require a 16- or 20-gallon copper boiler, a press, a dipper, several tins, and a container for the slumgum. A tap screwed to a pipe through the copper casing and connected to the copper near the bottom is useful for drawing off hot water free from refuse.

Working the Press

Fill the copper three-quarters full with water, add old combs until it is full, and while it is being brought to the boil stir well with a stick. The press should be set nearby, as illustrated, with the screw turned up. A strainer made from a strong sugar bag cut down and opened out, or a 40in. square cut from a wool pack, would be suitable. Spread the straining material over the inside of the press can, draw off some hot water from the copper boiler, and thoroughly heat all parts of the press with it. Dip up 2 gallons of the melted combs and water, place this in the press can, fold the straining material over on top, and place the follower on top of all.

A Manual for All Apiarists : "Beekeeping in New Zealand"

UP-TO-DATE methods of apiary and honey house management most suitable in the Dominion are fully expounded in Bulletin No. 267, "Beekeeping in New Zealand." In its 140 pages and 180 illustrations are the answers to problems which beset every beekeeper, whether he has one hive or hundreds. Covering every aspect of the industry, from establishing an apiary to marketing the honey, it is the first complete manual of beekeeping devoted specifically to New Zealand conditions. This book, written by T. S. Winter, Senior Apiary Instructor, Wellington, will fill a long-standing gap on the bookshelf of every New Zealand apiarist. Bulletin No. 267, "Beekeeping in New Zealand," is obtainable from any office of the Department of Agriculture for 2s. 6d., post free.



[*Max Binning photo.*

Fig. 7.—**The apparatus and the recovered wax.**

Pressure may then be applied by turning the screw. After being squeezed through the strainer hot water carrying with it liquid wax will run out through a small outlet spout into a tin set in front of the press. This type of press does not require to be tipped forward to empty it. If the container which receives the wax and water has a small tap soldered in near the bottom, the hot water can be run off without wax and returned to the copper boiler. After the screw has been run right down it should be released and the outside edges of the bag folded under and pressed again. This will secure all the wax it is practicable to obtain. By this system of pressing—small amounts each time the press is manipulated—more wax will be obtained than by any of the large-scale methods often used, and the quality of the wax is not impaired through the action of iron or steam, as is often the case.

Value of Output

If the work is well organised, one operator should be able to cut the combs from 280 frames and press them free of wax in 8 hours. These combs should yield between 84 and 91lb. of beeswax, which is twice the amount of the comb foundation used. Ten combs contain as much as 3½lb. of wax, but an average of 3 to 3¼lb. may be considered good pressing. The total value of the wax recovered for one day's work is, therefore, between £8 8s. and £9 2s.

Slumgum is a valuable by-product and should never be wasted by burning it. Save it all for garden manure, as results prove it to have outstanding manurial qualities.

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Care is Essential in Planting Small Fruits

BECAUSE the success of small-fruit plants depends largely on the start they are given, it is essential that the work of planting them should be carried out thoroughly. Careless, indifferent methods, especially in planting raspberries, may give the young plants a check from which they will not fully recover for several seasons, writes J. P. Hudson, Horticulturist, Wellington.

RASPBERRIES

RASPBERRY suckers for replanting should not be lifted until they are actually required for planting or sending away. Each should be dug with care, the soil within a radius of a few inches being cut round the sucker with a spade to sever the roots. The spade should then be inserted under the block of soil to sever any vertical roots, and the plant shaken out from the loosened earth. Dug in this way each sucker should have a mass of fibrous roots. Suckers which are jerked out of the ground (perhaps after putting a spade in to one side of them and then using it as a lever) will have few fibrous roots and will be less able to re-establish themselves when planted.

Experiments carried out at the East Malling Research Station in England have shown that the size of canes for planting is much less important than the number of roots which each cane has, and the way in which the canes have been handled between the time they are dug and when they are planted. Small, well-rooted canes generally grow much better than canes which are larger, but which have fewer roots, provided the plants have been properly treated from the time when they are lifted until they are planted out. On the other hand the research station has also shown that if two suckers have an equally healthy root system, the one with the largest, thickest cane can be expected to become established better if a very dry spring and early summer follow planting.

Lifting the Canes

The work of lifting raspberry canes, especially on a large scale, requires a considerable amount of organisation if it is to be done properly. As the young plants are lifted they should not be left about unnecessarily, since the fibrous roots will be severely damaged, and may even die, if they are allowed to dry out. If the canes are to be left for any appreciable time, they should be put into small heaps as they are dug, and covered in the field with wet sacks, or put into boxes or buckets which can be covered with sacks. If the canes are to be sent away, each bundle should be made up as soon as sufficient have been dug. It is usual to make up bundles of 50, tying each bundle at the soil mark and near the tips of the canes. As soon as the bundles are tied they should be protected against damage, and the roots kept moist by applying a layer of damp hay or straw round the roots of one or more bundles. The layer should be tied in place and the job completed by wrapping the whole collection in sacking tied securely with twine. The bundle may be made up with the ends of the canes still showing, because they will be cut off later, but the sacking should extend well up the canes to beyond the original soil level to avoid damage to the lower buds. Properly handled, dormant raspberry canes will travel perfectly well. Careless workmanship in bundling usually results in drying of the roots, many of which will later die.

Drying of the roots between digging and planting has a much more serious effect on the subsequent establishment of the new plant than most growers realise.

Heeling In

Bundles of plants should be opened as soon as they are received and the roots dipped in a tub of water if they show signs of being dry. The ties round the bundles should then be cut and the canes either planted out at once or heeled in. When heeling in it is essential to line out the plants in a trench and give each a shake after replacing the soil, which is then firmed to ensure that every root is in contact with the soil. Canes are sometimes seen heeled in in bundles, with the string still uncut. This can lead only to the inside roots drying out, as they are not in contact with moist soil. Plants properly heeled in can be left safely, if necessary, for months through the winter before they are planted.

Autumn Best Time for Planting

Though raspberry canes are dormant through the winter, the roots continue to develop slowly under the relatively-warm winter soil conditions in New Zealand, except in very cold districts. There is no doubt that the best time for planting raspberry canes is in the autumn as soon as the leaves fall. Canes planted then will quickly

[Hope, Cross, and Richardson.

Autumn is the time for a thorough clean-up in the raspberry garden. Rotary tillage is ideal for producing a good tilth without disturbing the soil too deeply and damaging the raspberry roots. A close watch should be kept on the soil turned over, and if any roots are being brought up, the rotor should be raised.

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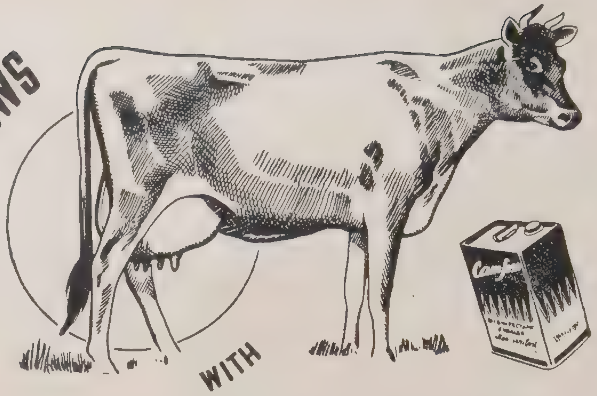

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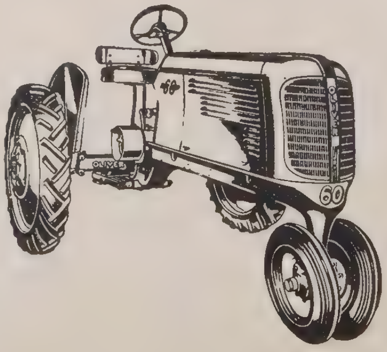

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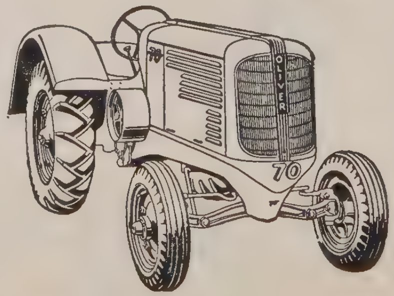

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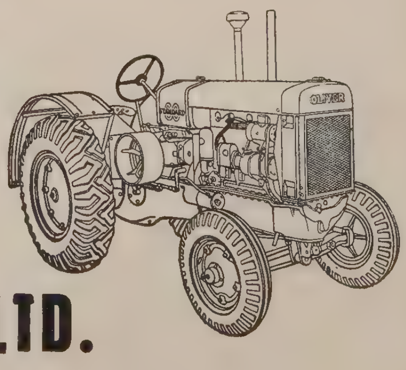

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develop new roots and will be well established by the following spring, when they should produce a satisfactory number of new canes to fruit the following season.

If canes are not received until the ground is sodden with winter rain, it is better to delay planting until conditions improve, and heel in the canes in the manner previously described. The suitability of soil for planting can be determined when walking on it. If it cakes on the boots it is too wet, because pressure when plants are firmed in will ruin its texture and turn it from tilth into mud, in which lack of air prevents proper root development. On the other hand even dormant canes require a small amount of moisture, and it is as damaging to heel or plant out in bone-dry soil as it would be to allow the roots to dry out before they are planted. Canes received when the soil is very dry should be heeled in and well watered to await better soil conditions for planting.

It has become a tradition that canes not planted in the autumn should be left until spring. It is hard to see the reason for this, except in extremely cold districts. Elsewhere canes can be put out at any time during the dormant season, provided that planting is done only when the soil is in proper condition. The earlier this is done the better, as it enables winter rains to consolidate the soil round the roots and reduce the risk of their drying out in the spring.

Each cane should be planted to about the same depth at which it was growing before being lifted; this is indicated by the soil mark on the stem.

Canes are planted best by hand. Holes should be dug large and deep enough to enable all the roots to be spread out fully. Shake the cane gently up and down as the soil is returned to settle it between the roots, and tread firm. If the area has not already been manured, 2oz. of blood and bone should be mixed with the soil round each plant as it is filled in. A plough can be used to open out a furrow into which the plants are placed and then filled in by hand, but the work has to be done very accurately to ensure that the canes are planted in straight lines.

Pruning

A cane in its first year will normally bear a little fruit, but on no account should it be allowed to do so, because fruiting in the first year has a marked weakening effect on the new cane with a loss in the next year of far more fruit than the few which could be picked in the first season. Nevertheless, newly-planted cane should not be cut off to ground level at the time of planting, as a few young shoots are needed to keep the root system alive until new suckers arise from below the ground. Cutting the cane down to ground level at planting time often causes the root to die outright.

Between the time of planting and the early spring canes should be pruned to within a short distance (usually 6 to 12in.) of the ground, leaving about three healthy buds on each. If the lower buds are damaged or have been knocked off, the canes may have to be cut higher to leave three buds on each. As long canes are more liable to wind-rocking than short stubs, it is best to prune them at, or shortly after, planting time.

[Sparrow Industrial Pictures Ltd.

Branch of a bearing feijoa tree.

The correct treatment of these shortened canes in spring is important, as it has a bearing on the amount of new growth which will be made. When new suckers grow the treatment (which will be dealt with in detail in a later issue) consists of reducing the stub and lateral growths until finally the old cane is cut completely away down to ground level. This should not be done, however, until the new shoots are several inches high and growing strongly.

The pieces cut off in this initial pruning should all be carefully collected and burned. Hygiene is most important when establishing a new small-fruit garden to reduce the risk of introducing infection from the garden out of which the new cane was dug.

FEIJOAS

In reports recently published by the Plant Diseases Division of the Department of Scientific and Industrial Research it has been shown that there is considerable variation in the character of fruits produced by feijoas raised from seed. There is a wide range in the weight of crop produced by different trees in their first years, some coming into bearing much earlier than others. The fruit also varies in shape, colour, size, appearance, and in the flavour and colour of the flesh. Such variations are obviously undesirable, and growers who intend to plant feijoas should endeavour to obtain stock which has been raised vegetatively from trees which have a known record of heavy, early bearing of good-quality and uniform fruits. Vegetative propagation is the only way of ensuring an even sample of fruit which can be made up into an attractive pack. The various methods of propagating feijoas were described in an article in the November, 1946, issue of the "Journal."

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APPLICATIONS for allocation during the current year of the following Certified Government Stock seeds are at present being accepted by the Department of Agriculture:—

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Applications for these seeds must reach the Director of the Fields Division, Department of Agriculture, Box 3004, Wellington, not later than **May 31 next** to be considered in any allocation to be made this year.

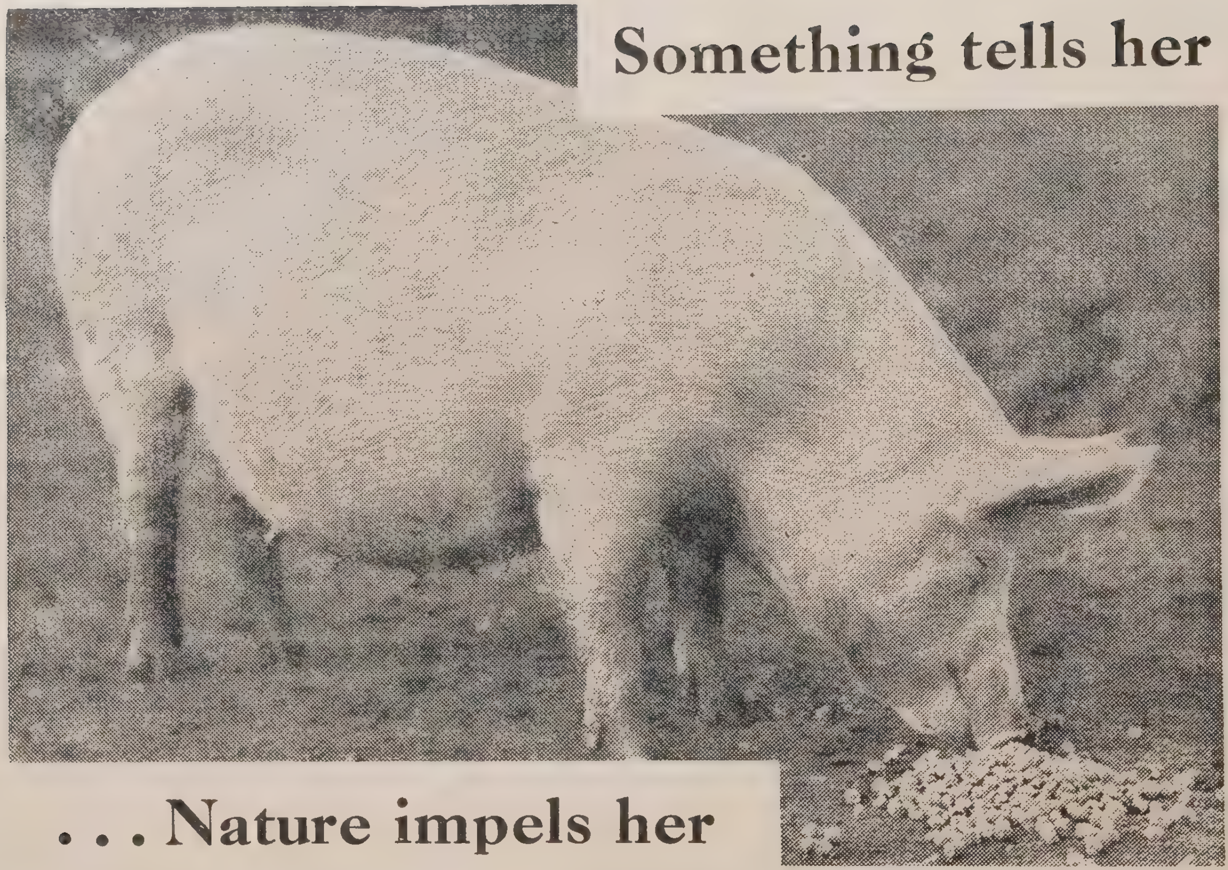
Applications must be made by mercantile firms on behalf of individual growers and must include the following information:—

1. Name and address of grower.
2. Quantity of seed required.
3. Acreage of paddock to be sown. (If more than one paddock acreages of each to be given separately.)
4. Registered number and letter of area concerned if possible.
5. Where more than one class of seed is requested the application must state clearly whether the seed is required for separate areas, whether the requirement is in the nature of an alternative application for the same area, or whether different kinds of seed are to be sown together in the one area.

Growers should make particular note of the altered closing date, namely May 31, not June 30 as in previous years.

Note.—Certified Government Stock cocksfoot seed is produced and distributed by the Canterbury Agricultural College, Lincoln, to whom intending purchasers are referred for particulars of supply.

J. H. CLARIDGE,
Agronomist, Wellington.



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PIG-MEAT PRODUCTION MUST NOT DECLINE

Risk of Losing Good Will on Home Market

By A. LONGWILL, *Assistant Superintendent of the Pig Industry, Livestock Division, Wellington.*

REALISATION of how sadly our pig production has slipped in the last four or five years is brought home by study of the figures for all slaughterings in meat export slaughterhouses, abattoirs, rural slaughterhouses, and estimates of farm-killed pigs for years ending September 30. In 1940-41, the peak year, 1,007,000 pigs (52,600 tons of pig meat) were produced; in 1945-46 only 664,000 pigs (38,400 tons) were slaughtered. This is nearly back to the position in 1930-31 (525,000 pigs: 25,000 tons pig meat). Must we assume that nothing short of another depression will make us take an interest in what is, after all, the most efficient form of meat production.

WE have a large surplus of suitable foods for pigs, and the efficiency of the pig as a converter of such foods into human food is well known. Why, then, has the pig (and the dairy cow to a less extent) fallen back in the race with sheep and fat lamb production?

Part of the answer undoubtedly lies in the relative prices ruling for the animal products sold and the net profit remaining when all production costs have been deducted. That this is so is shown in the case of the moderate-sized farms in many dairying districts where the change from dairying to fat lamb production has taken place. But the fact that dairying and pig raising are more continuous work and have a higher labour demand is a very big part of the answer under our present conditions, when farmers are finding it hard to get value for money spent and feel that it is not worth while to expend the extra effort entailed in securing the extra return which would be obtained by giving more attention to the utilisation of by-products.

From the angle of maintaining a pig industry capable of contributing considerable tonnages annually to the United Kingdom market the problem is, therefore, largely an economic one which must receive the serious consideration of all associated with the industry. It is proposed, therefore, to review our pig industry, particularly with a view to taking stock of future prospects and possibilities and to point to the lines of effort which appear to give more promise for the future prosperity of the industry.

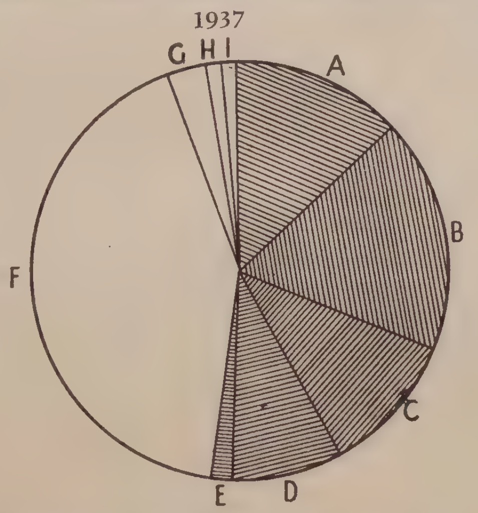
The United Kingdom Market

The United Kingdom market for pig meats—New Zealand's only export outlet—and our position with relation to the normal, and the present, extent of the market should first be examined. As shown in the accompanying diagram, the total pig meats coming on to the United Kingdom market in 1937 (taken as a fairly normal year) was 963,000 tons, of which New Zealand supplied 29,600 tons, or less than 3 per cent.

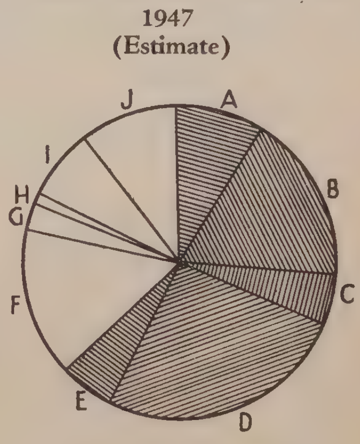
There is a potential market worth more than £100,000,000 to the farmers of the supplying countries. But the diagrams showing estimates for production during the coming year (compiled from data published by the United States of America Department of Agriculture Office of Foreign Agricultural Relations and the estimates of this Department) reveal that not only have the total supplies to the market fallen to little more than half the pre-war level, but that New Zealand's share of the market has remained static because of the reduction of our exports of pig meats to half the pre-war quantity. In a country where by-products ideally suited for pig food are going to waste this should surely give us cause to question our business common sense both nationally and individually.

PIG MEATS ON UNITED KINGDOM MARKET AND NEW ZEALAND PRODUCTION

Bacon: Shaded portion of each circle. Pork: Unshaded portion of each circle.

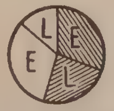


Total supply of bacon and pork for United Kingdom market in 1937, 963,000 tons. Sources of supply: Bacon—A United Kingdom, B Denmark, C other European countries, D Canada, E U.S.A. and Argentina. Pork—F United Kingdom, G New Zealand, H Australia, I Argentina, U.S.A., Canada and other Empire countries.

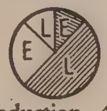


Total supply of bacon and pork for United Kingdom market in 1947, 527,000 tons (estimate). Sources of supply: Bacon—A United Kingdom, B Denmark, C other European countries, D Canada, E U.S.A. Pork—F United Kingdom, G New Zealand, H Australia, I Argentina, J U.S.A.

NEW ZEALAND PRODUCTION AND ITS DISPOSAL



Total production 47,000 tons.
L—Local consumption.
E—Export.



Total production 40,000 tons (estimate).
L—Local consumption.
E—Export.

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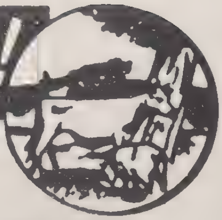

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Those who remember when they were struggling for survival during the depression how handy the returns from pigs were will freely admit the importance of a healthy pig industry to cushion the effects of severe market fluctuations in the main dairy products. They will agree that every possible form of insurance against depression and a restricted market is well worth while. Increased pig production now, when it is not particularly attractive superficially, can be regarded as an insurance. The extra effort made can be regarded as the premium.

The question may be asked, "Why not leave it until we feel the need?" There are several reasons for a more farsighted attitude:—

(a) If restrictions return, our future market may well depend on what output we have been able to achieve over the intervening years. Conversely, if world food organisations are successful in securing better food distribution, we would by increasing production be increasing our purchasing power and raising our status among food-producing nations.

(b) **There is urgent need, and a great deal of good will, on the Home market for our pig meats NOW—and some of the good will will inevitably be lost if we do not get more pig meats on to that market.**

The position for the present season is that the local market could consume practically all the baconweight pigs which are produced and at least one-third of the 15,000 tons killed at porker weights. It appears unlikely that more than 10,000 tons of porkers and 5000 tons of baconers will be available for export. As a basis for a claim on a future market at least as good as our previous best export figure (almost 30,000 tons, which was far from being the limit of our potential) this is not at all satisfactory. In fact, it represents such a small proportion of the whole Home market for pig meats that some of the larger operators could hardly be blamed if they adopted the attitude that it was not worth consideration. Certainly they would not be more blameworthy than we are if we allow any pig food to go to waste under the present conditions of world shortage of fats and meat.

This present shortage makes operators keen to get supplies wherever they can, but when Ministry of Food purchasing arrangements are relinquished operators can be expected to show preference for sources where reasonably large lines of uniform quality can be secured. If we are to be prepared for that day, we cannot afford to allow our pig production to continue to decline as it has been doing for the past five years.

The National Pig Industry Council is seriously concerned over the trend, which does not yet appear to have been arrested, although it is hoped that the effect of the increase in schedule prices which has been obtained, largely through the representations of the council, will be shown in an increase in the latter part of the season. The council is satisfied that the returns obtainable with good management are now sufficient encouragement for those who have the by-products or other cheap feed available for pig raising.

To be successful in making the fullest use of the foods available for pig feeding we must have an aim and a standard of efficiency of production by which each producer can measure his own success or discover his sources of inefficiency.

Production Target

The pig industry in New Zealand is concerned mainly with the utilisation of dairy by-products, although a few pigs are produced on town garbage, abattoir offal, and arable farms.

Taking the production figures for the 1945-46 dairying season and making allowance for amounts used for calves, buttermilk, production of dried milk, and whey used for sugar-of-milk extraction, the net amount available for pig feeding was 500,320,000 food units. This is arrived at as shown in the table below.

It is no easy matter to plan the full use of this amount of dairy by-product, particularly because of the highly-seasonal nature of the dairy industry. It is hopeless to think of being able to do this without thorough planning to provide both the food for the "off season" when milk is inadequate—and this is over a longer period than most farmers provide (probably 7 months if we are able to get the fullest use of our dairy by-products)—without overfeeding, which is itself a source of waste and leads to poor grading results.

To provide the extra food it will prove profitable to have 10 to 15 per cent. of the total of concentrate quality (meat meal or grain, etc.) and 30 to 40 per cent. obtained from roots and grazing. This will mean buying or growing (pea meal can be made to substitute for meat meal to a certain extent) 1 to 1½cwt. per cow (or 10 to 15cwt. per sow) of concentrate food and also allowing ¼ acre per sow for root crops and a similar area for grazing. Extensive grazing should be the principle followed, except when it is necessary to control sows and litters in small pens.

With such a system of food provision total food supply for pigs for the 1945-46 season would have been as follows:—

Dairy by-products ..	500,000,000	food units.
Concentrates	100,000,000	,, ,,
Roots and grass	300,000,000	,, ,,
Total	900,000,000	,, ,,

This quantity of food is sufficient for the production of 67,000 tons of pig meat. Had this level of production been achieved, we would have been able to export three times as much pig meat as we did last year. Our actual production of 38,000 tons is a measure of our failure to take the necessary steps to see that our by-products will be utilised.

The essential steps are:—

(a) To see that at least ¼ acre per sow of a suitable root or kale crop is grown next season for autumn and winter feeding. One-third of the area in kale or late-sown peas for feeding green in the autumn will prove invaluable in feeding sows which are to farrow in the winter and will also materially assist in getting off porkers from the second litters. Of the root crops for the main winter feeding, artichokes and swedes will appeal where labour scarcity is the limiting factor, though they will not yield as much food per acre as sugar beet, mangolds, and pumpkins. The first of these is highly nutritious and is particularly suited to the pig whose simple stomach is not well adapted to deal with very bulky foods. When the roots are being fed they should be supplemented with ½lb. meat meal per pig for stores and up to 2lb. per day for sows close to farrowing or those which are nursing.

(b) To arrange matings of sows to ensure that, as far as possible, pigs are available to cope with the full flush of the milk in November, December, and January. At the same time it has been found necessary for maximum profit to have two litters a year from each sow. If farrowings are planned to take place in May and

Butter production		462,566,000	gallons skim-milk food units.
		27,754,000	gallons buttermilk food units.
Farm buttermaking		10,000,000	gallons skim-milk & buttermilk food units.
Cheese production (after extraction of fat for whey butter)		150,000,000	gallons whey = 75,000,000 food units.
Total by-products =		575,320,000	food units.
Less—Calves	70,000,000		
Buttermilk & whey used for other purposes ..	5,000,000	75,000,000	food units.
		500,320,000	food units.

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Neca Products are effective combinations manufactured to exacting standards from the finest ingredients.

Agents in N.Z.: All branches of the Farmers' Co-op. Companies and Association. In Hawke's Bay, obtainable from Williams and Kettle, Ltd. Ask your merchant to obtain for you.

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June and again ("second litters") in November and December, the best approach to making the pigs' requirements fit the available milk supply will be obtained. If the second litters are sold as porkers from February on, the requirement of crop will be minimised, although still not inconsiderable. These facts are borne out by the accompanying diagram, which is drawn to scale and is based on the actual fluctuation of dairy by-products available. The absolute necessity of providing a considerable quantity of feed for the period March to September each year, if the flush milk is to be fully used, will be evident from a study of this diagram.

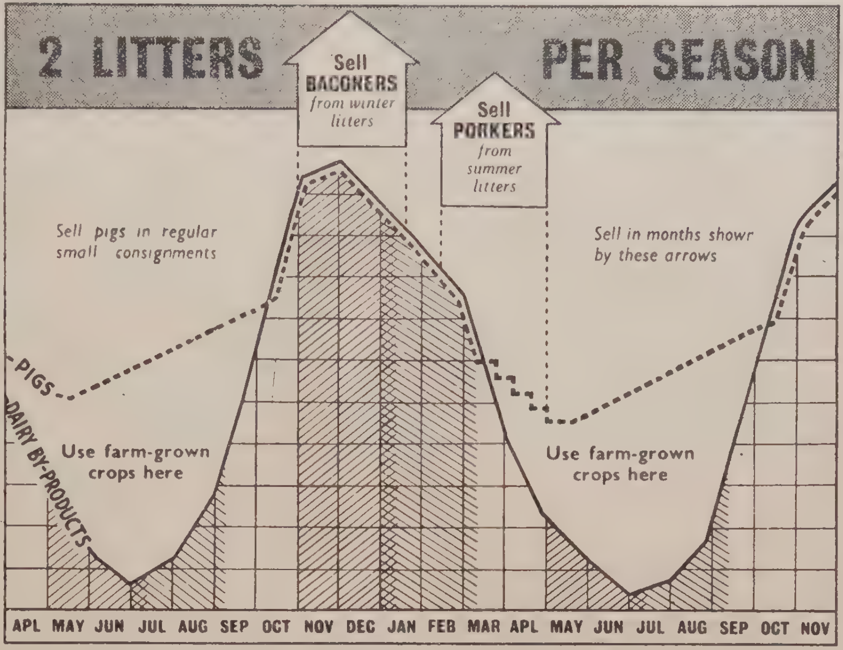
The system worked out for a 30-cow herd rearing 6 calves and carrying 3 sows and their progeny on skim-milk, selling 20 baconers during November-January and 20 porkers from the beginning of March until the end of April, showed a requirement of 18cwt. of meat meal, 1½ tons grain, and ¾ acre roots, which may include sugar beet, pumpkins, carrots, swedes, artichokes, or mangolds, mainly for use from May to October.

Efficiency Standards

This system shows a gross return of nearly £5 a cow or a return after all meals are paid for at present market rates of £3 12s. a cow. This is a reasonably high standard of efficiency and may be a useful guide to others wishing to measure their efficiency in pig raising on skim-milk. It represents the production of 140lb. pig meat per cow (1400lb. per sow). On whey feeding a higher level of concentrate feeding is required, but a standard of 90lb. pig meat per cow can be attained, leaving a net farm return of £2 per cow (or per 500 gallons whey).

From the point of view of the number of sows carried the proportion of sows to cows will vary from 1 to 5 on a home-separation farm concentrating mainly on weaner and store production; 1 to 10 on fattening half baconers and half porkers, and up to 1 to 20 in fattening mainly baconers on whey feeding. But with this variation there should be a definite aim of securing two litters from each sow in the 12 months and thus securing 12 to 14 pigs weaned per sow a year. On straight-out baconer production a gross return of £60 per sow can thus be attained, or on part bacon, part pork a gross of £50 per sow.

Improved Housing



—— Supply of milk etc available for pig feeding

---- Food requirements of pigs.

▨ Months when most sows should farrow

▧ Periods when sows should be mated

Although materials for building new houses are scarce, it is not impossible for determined farmers to make some progress. In view of the effect of better housing and well-planned layout in improving pigs' efficiency of food conversion and reducing labour costs, no one should neglect an opportunity of improving accommodation for pigs. Plans of the most satisfactory designs of housing are obtainable from the supervisors of District Pig Councils, who are well equipped to help farmers get full value for any money spent in this way.

Quality of Our Product

A period when demand for all qualities of meat is keen is never good for the general standard of quality, and it is particularly noticeable that with the reduced number of pigs being produced, coupled with a strong local demand for the heavy baconer, the tendency is to produce excessively fat and overweight pigs from unsuitable material. This practice will have an effect on the quality of pigs for export unless the position is very carefully watched.

The system of grading and payment of a premium for quality, as demanded on the Home market, will be essential to the maintenance of the good name we have made for ourselves in the United Kingdom and will have to be reintroduced as soon as practicable when competitive purchase returns, so that the purchaser will have confidence in the quality of pig meat he is buying.

Conclusion

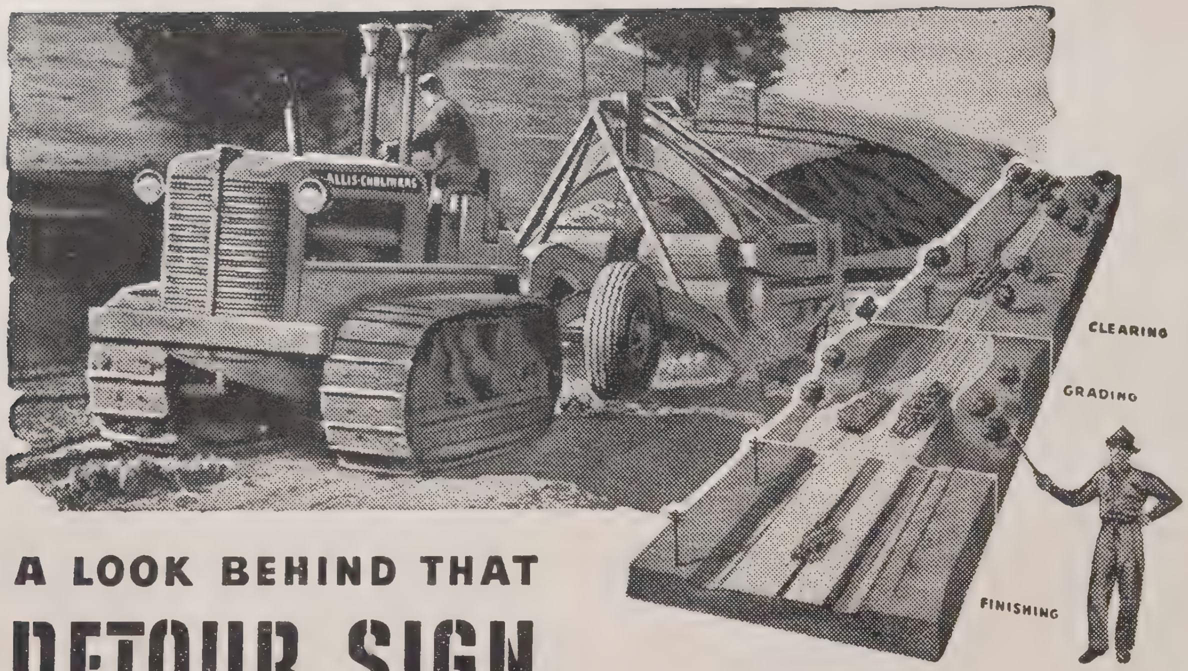
This article has aimed at setting a target for the industry and to give those who have entered the industry since the war an idea of the possibilities and standards they should strive for. Coupled with the campaign for increased dairy production, the target of 70,000 tons of pig meat a year could be achieved in four or five years if we set about it with a will. It is recognised that this will be done only if:—

(a) The farmer weighing up present facts and future possibilities is convinced that it is a profitable move.

(b) All concerned agree that the immediate increase of pig production is desirable at least as an insurance.

(c) Each one does his utmost to see that the necessary steps are taken to ensure the attractiveness of pig raising as a business proposition.

If you cannot see your way to speeding up the tempo of your pig production in keeping with the target indicated, you should make your position known to the representative of the District Pig Council for your area, who can put your problems before his council and probably help you directly or, if the problem is a national one, he can transmit it for the attention of the National Pig Industry Council.



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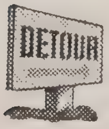

RURAL CREDIT IN NEW ZEALAND

Operations of Agencies Supplying Farm Finance

AS most farmers do not possess all the funds necessary for obtaining and operating a farm according to present-day standards of efficiency, numerous agencies have been developed to supply farm credit. On this important subject F. R. Bray, Field Economist, Rural Development Division, Wellington, in response to numerous requests from readers and, in particular, the executive of the Young Farmers' Clubs, has prepared a summary of the operations of the various agencies supplying farm credit in the Dominion.

CREDIT is somewhat arbitrarily divided into long-, intermediate, and short-term credit.

Long-term credit is commonly required by the farmer for the purchase of land and such improvements as fences, buildings, water supply, and drainage.

In New Zealand **intermediate credit** covers periods of from one to five years, and is related to the purchase and breeding of livestock, pasture improvement, scrub control, maintenance and improvement of farm buildings, machinery, and implements. Intermediate credit is also allied to marketing farm produce where, as in the case of wool held back for better prices, it lasts for more than a year.

Short-term credit covers items such as annual wages to farm hands, rent, insurance, interest, repairs, maintenance, seeds, fertiliser, stock foods, lighting, power, sacks, caps, sprays, professional services, and marketing. It provides for the period between working cost outgoings and receipts from the sale of produce.

The productive life of the farm asset sets a limit to the term of the loan. If a substantial mortgage is required to purchase an interest in a farm, it is wise to have it on a long-term basis. This gives some security that the loan will not be suddenly withdrawn. Refinancing a loan in such a case is costly and, at times, very difficult.

But since short-term indebtedness financed by bank overdraft can be repaid at will, and varies with day-to-day requirements, it is cheaper and safer to raise loans on this basis where the borrower's purpose or position makes it possible. Similarly borrowing on intermediate credit where practicable gives better control over the amount of debt outstanding than if long-term debt is incurred.

Great importance attaches to the terms on which long-term credit is raised. If the farmer, whether owner or lessee, has been able to start with or to build up an appropriate equity in the property (1), the financing of his short or intermediate credit is so much the easier. Over-valuation of a property or commitment of income to the instalment purchase of motor-cars, tractors, and other farm machinery without adequate allowance for depreciation may make it difficult for him to build up such an equity.

Some aspects of this are well illustrated by the report on the Deterioration of Crown Lands dated 1925, which states: "The over-estimation of the capabilities of the country and the high goodwill paid on transfer since about 1908 have in many cases led to excessive rental values being credited to the land, and in consequence an excessive percentage of the returns that could otherwise have gone into improvements when the secondary growth was in the initial stages had to be swallowed in rent."

Substituting interest and principal instalments for rent, this could apply as well to farmers whose freehold properties are subject to flat or table mortgages. Lack of good security such as an equity in the property means that loans, if obtainable, carry high interest rates to cover the added risks to the lender. This inability to raise shorter-term capital easily might mean that a farmer's income is not as high as it could otherwise be. It might even mean that, as in the cases referred to in the report, his capital assets were actually wasting. The importance of maintaining a balance as between long-, intermediate, and short-term credit follows from this.

Tenure and Mortgage

(a) **Tenure:** A leasehold tenure, giving security of tenure, may be considered equal to an advance of long-term credit. Tenure will affect the amount of finance to be found as well as the form of the capital costs. According to tenure, capital costs will take one or more of the following forms: interest on the farmer's equity in the property; interest charge on mortgage debt; instalment payment of capital value; rental on capital value.

Whereas in the case of freehold farms it is necessary to find the full purchase price less any existing mortgage debt which the purchaser is able to take over, this is not so with Crown leases. In many cases only the value of improvements carried out by former tenants will have to be met.

At present servicemen are receiving priority in settlement and Crown lands are not being offered for civilian selection. But in normal times rural Crown land leaseholds (unimproved land) are taken up on renewable lease, offered at a rental of not more than 4 per cent. on a capital value, which is subject to revaluation and renewal every 66 years.

Settlement lands (lands purchased by the Crown from private owners for subdivision and closer settlement) are also let on renewable lease, which gives rights of renewal on 33-year terms. At the end of each term the leases come up for revaluation. The rental is 5 per cent. on a capital value, which may or may not correspond with the costs of acquisition and subdivision. Buildings are valued and paid for separately by instalment over 36½ years or some shorter term.

High country lands in the South Island are leased, as pastoral runs only, the leases being tenable for up to 35 years and carrying a right of renewal (if the land is not suitable for subdivision). The rentals are fixed by arbitration at the end of each term, the original rentals being fixed by the Crown.

Other pastoral lands are offered as small grazing runs and are leased for terms of 21 years with right of renewal, the rentals being fixed by arbitration. There are no restrictions as to cultivation or cropping as in the case of pastoral runs.

Under the Small Farms Act 33-year renewable leases may be granted with the rentals based on 4½ per cent. of the unimproved value, but with no right of freehold. Improvements on these "small farm" areas are dealt with separately by way of mortgage.

This exhausts the main tenures offering in normal times. There are, however, many leases in perpetuity (999 years) still in existence, but such leases cannot now be granted because the legislation has been repealed. Similarly there are some occupation with right of purchase licences still outstanding.

Except for leases to civilians under the Small Farms Act and leases of endowment lands, it may be said that practically all Crown tenures carry the right to freehold. Crown lands thus provide a stepping-stone to farm operation and ultimate ownership. Other advantages are that holdings have sometimes been reclassified, pay-

---

(1) Most lending agencies will lend up to two-thirds of the value of the relevant security (first mortgage).

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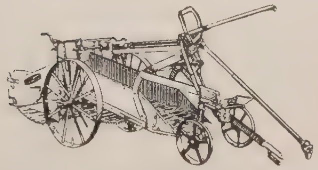

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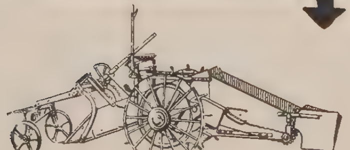

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ments modified, or boundaries adjusted when units proved too small.

The Crown is a considerate landlord in times of difficulty. Hardship clauses provide for remission, postponement, or reduction of rent and interest payments. Similar concessions apply to the payment of principal instalments, so that from these and other points of view it seems desirable that the Crown leasehold area should not shrink too small or good land become completely excluded from it.

Leases from public bodies or private land owners are not so important; nor is it possible to generalise about them, but no difference in principle is involved.

Sharemilking agreements, however, deserve special mention. These take several forms. If a land owner provides plant and herd, a sharemilker must receive not less than 29 per cent. of the milk and cream cheque. When maintenance is done as well the sharemilker must then receive not less than 39 per cent. of the gross proceeds. Should the herd be supplied by the sharemilker, the standard division of income is on the 50/50 basis. The Sharemilking Agreements Act, 1937, provides for agreements in which the employer owns and provides the herd, and regulations gazetted in September, 1946, define the legal rights and duties of both parties. Sharemilking agreements are often regarded as a step towards farm ownership, providing experience and an opportunity to accumulate capital.

Summary:

Tenure helps to even out the demand for credit. The proportion of leasehold lands is highest in the holdings with highest aggregate market values. Statistics of the number and area of holdings according to purpose and tenure were collected for the 1929-30 season for the first World Agricultural Census. They gave the results shown in Table I below (2).

Thus, as the average size (and value) of the holding increases the proportion of freehold tends to fall.

(b) **Mortgage Debt:** Levels of mortgage debt help to determine the amount of new long-term credit which farmers have to raise in financing transfers. The total mortgage debt on New Zealand farm lands, but not including those on stock, wool, crops, or chattels, is substantial. At March 31, 1944, it amounted to an estimated total of £115,000,000 on some 85,000 holdings, one-third of which are under 50 acres. This, however, represents a sharp drop during the war and the total of such debt is the lowest for 20 years.

The following details of mortgage debt are taken from lands returned for land tax. The area of these is approximately equal to the total of freehold lands.

Mortgage debt excluding unregistered mortgages and chattel liens is equal to the Government unimproved value in the case of smaller farm properties of 100 to 150 acres. But it is only about seven-tenths of such value in the case of properties of from 3000 to 7500 acres. As against this the smaller properties carry a higher ratio of improved to unimproved values. In the dairy districts of Waikato and Northland the ratio of improved to unimproved value is 3 to 1, while in the remaining dairy districts it is nearer 2 to 1. Mixed dairy and sheep, and mixed cropping and sheep, as in Wellington and Canterbury Land Districts, vary between 1¾ and 1½ to 1, while in extensive sheep districts the ratio of improved to unimproved value is 1¼ to 1. On this basis the following table gives a conservative estimate of registered mortgage debt as a proportion of **improved** Government values in different types of farming (data obtained from Local Authorities Handbook, 1942-43, and statistics relating to Land Tax for the tax year 1941-42):

	Average improved Govt. values as a percentage of unimproved values. per cent.	Average mortgages as a percentage of improved values. per cent.
Dairying	233	45
Mixed farming	166	45-50
Pastoral sheep and cattle	133	50

TABLE I

Average Size of Holding in Acres and Percentage of Land Held Under Different Tenures Classified According to Purpose of Holding.

Purpose of Holding.	Wholly Freehold.		Wholly Leasehold.			Mixed Freehold and Leasehold.		Total all Holdings.	
			Crown.	Private.	Total Crown and Private.				
	Avge. Size. Acs.	Per Cent.	Avge. Size. Acs.	Avge. Size. Acs.	Per Cent.	Avge. Size. Acs.	Per Cent.	Avge. Size. Acs.	Per Cent.
Orchards	25	85	27	11	7	46	8	26	100
Dairying	108	66	119	90	11	144	22	105	100
General mixed ..	140	60	112	111	20	195	20	142	100
Mixed agric. grazing	415	57	370	300	22	585	21	425	100
Mixed dairying grazing	375	50	365	295	28	600	22	412	100
Sheep farming ..	990	30	2,014	560	40	3,460	30	1,720	100

TABLE II

Land District.	Mortgages Registered Year ended March 31, 1944. No.	Acres.	Amount Secured. £	Mortgages Registered Year ended March 31, 1945. No.	Acres.	Amount Secured. £
Auckland ..	2,231	399,073	2,371,682	2,148	380,168	2,353,378
Taranaki	380	81,171	609,384	380	84,087	562.824
Wellington ..	820	251,931	1,228,321	870	225,402	1,420,069
Hawke's Bay ..	235	83.122	420,614	266	103,561	428.824
Gisborne ..	103	97,830	205,893	114	74,441	167,379
Nelson	172	21,004	117,238	206	45,114	179.450
Marlborough ..	85	50,463	127,621	85	87,276	167.902
Canterbury ..	693	186,563	916,694	838	248,207	1,115.899
Otago	458	182,042	419,079	597	171,359	624,636
Southland ..	381	118,085	433,935	416	99,753	478.773
Westland ..	37	5,923	30,046	40	7,980	42,938
	5,595	1,477,207	6,880,507	5,960	1,527,348	7,542,072

As leasehold is more common in properties of greatest aggregate value, so mortgage debt is also higher. Pastoral holdings show a low unimproved value an acre. The table does not therefore compare the difference in value of improvements **an acre** in the different types of farming.

As the above figures represent only central tendencies, it is to be expected that there will be considerable deviation on either side. Those farmers who have been paying off debt over a number of years will have a lower debt as a proportion of Government valuations. Contrariwise others just starting off, especially when chattel mortgages are taken into account, will usually have a much higher proportion. Of course, mortgage debt in excess of two-thirds of the value of acceptable security may have to be raised at 6, 7, or even 8 per cent. interest in place of the usual 4 to 5 per cent. to cover the greater risks undertaken by the lender. Moreover, it is advisable to have a margin of security against which to borrow for short and intermediate credit.

The actual amount of money raised by mortgage to finance the purchase and expansion of farm operations in the last few years is given in Table II below.

The average mortgage as disclosed by these figures is about £1250. This clearly understates the average mortgage debt per farm; it represents merely the average new mortgage money raised each year. It includes loans raised to purchase farms already mortgaged, to refinance loans, or to finance a movement from a less to a more valuable farm, as well as to purchase adjoining areas or part-time holdings. Therefore it is interesting to see that in the year ended March 31, 1946, the State Advances Corporation, whose work is almost solely confined at the moment to purchasing farms for ex-servicemen, loaned £4,401,262 to 1168 applicants, which is approximately £4000 per loan.

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(2) Cf. D. O. Williams in "Agricultural Organisation in New Zealand," pp. 178 and 181.

From this brief discussion of tenure and mortgage debt it is possible to conclude that a freehold pastoral or fat lamb farm (many come under the category mixed dairying and grazing) will require a greater command of capital funds if mortgage debt alone is considered. Yet, because of the larger proportion of these farms which are held either partly or wholly on leasehold, opportunities exist in this type of farming, as well as in dairying, for farmers who have accumulated savings of less than £1500 to £2000.

SOURCES OF FARM CREDIT

Against the background of tenure and mortgage debt the sources of farm credit, whether it be savings out of income, Government taxes, or bank credit, may be profitably discussed.

Agencies directing the flow of these funds to agriculture range from large organisations such as the State Advances Corporation or commercial banks to solicitors in country towns. There is also specialisation as to the type of farming catered for by the various agencies.

Long-term Credit Agencies

(a) **Private Lenders.** The greatest amount of long-term mortgage debt appears still to be held by private lenders. Little information is available on this type of loan, but an indication of the amount held by business and professional men, widows, or other small investors is obtained by subtracting from total mortgage debt the amount known to be provided through public institutions and large financial companies. In private lending solicitors help transact a substantial volume of business as agents for clients with funds to invest, their work in the conveyancing of land keeping them in touch with borrower and lender. Vendor mortgages, too, sometimes second or even third mortgages, are an important item in indebtedness, but they have tended to decline in importance, partly perhaps as a result of the depression. The increasing importance of the State Advances Corporation in the field of rural finance and a reduction of £20,000,000 in farm mortgage debt in the last 10 years suggest that private and vendor mortgages are becoming less important.

Private lenders have not the financial resources, the knowledge of what constitutes adequate security, or, in some cases, the prudence to abide by this knowledge that organised agencies possess. Indeed the popularity of private lenders has largely followed from the lack of formality, the ease with which advances were made in prosperous times, and the high percentage of mortgage debt acceptable in relation to purchase price. Consequently interest rates are sometimes higher and incidental costs nearly always so. The loans have usually been on a "flat" basis for a relatively short period (frequently 5 to 7 years) and may be difficult to renew when money is "tight."

(b) **The State Advances Corporation.**

(i) **Terms of Loans:** The most important organisation supplying long-term rural credit is the State Advances Corporation, which has branch offices throughout the country. The capital of the corporation, £1,000,000, is held by the State, which appoints the Board of Directors. The corporation is able to raise funds by the issue of State-guaranteed securities.

Usually it will advance on mortgage up to two-thirds of the value of the land or other appropriate security, but this limit may sometimes be extended subject to special arrangements. Loans are generally on a table mortgage with provision for repayment by regular annual instalments, and terms usually range from 30 to 45 years. However, flat mortgages renewable at the option of the corporation are sometimes arranged. Every mortgagor must deposit in cash, or borrow as an addition to the capital sum, 2 per cent. of any mortgage granted. This, with profits, is transferred to the corporation's reserve fund.

While mortgaged to the Corporation the mortgagor must not encumber the property further without the written consent of the State Advances Board.

The rate of interest on loans has for some years remained at 4⅛ per cent. With instalments, the annual cost of a table mortgage per £100 borrowed is given below for loans of different lengths:

Length of Loan.	Annual Cost. £	s.	d.
10 years	12	6	2
15 ,, ...	9	0	2
20 ,, ...	7	7	10
25 ,, ...	6	9	0
30 ,, ...	5	16	10
35 ,, ...	5	8	6
40 ,, ...	5	2	6
45 ,, ...	4	18	2

Loans are graded according to margins of security and the credit standing of the borrower. Securities impaired because of illness or other personal reason are frequently inspected.

(ii) **Loan Policy:** At present the corporation will advance for the purchase and development of farm properties with a view to increasing production or for the purchase and erection of houses, but will not advance for the discharge of any existing mortgage except when it is desired at the same time to develop the farm. This policy was adopted in the interests of stabilisation and to build up funds to meet the needs of returning servicemen. Thus loan business fell off during the war, but with the return of servicemen it has now greatly expanded.

RURAL SECURITIES

		No.	Value.
Year ended March, 1943	..	121	£233,569
,, ,, ,, 1944	..	323	£791,925
,, ,, ,, 1945	..	553	£1,708,609
,, ,, ,, 1946	..	1168	£4,401,262

At March 31, 1946, the value of rural securities held was £23,600,000, a decline of some £2,000,000 only since 1939. Rehabilitation loans are rapidly using up accumulated funds despite an acute shortage of construction materials and labour, and in recent months mortgages registered have exceeded mortgages discharged.

(c) **The Public Trust Office.** No figures are published showing the amount of rural securities held by the Public Trust Office, though some years ago it was estimated at £9,000,000 (3). The present total is probably about two-thirds of this. The 1945 report stated, "The supply of funds available for investment on first mortgage exceeds the demand, and lending operations under this heading have been considerably restricted . . . the general trend appears to be for rural mortgagors as a result of the good seasons being experienced for primary products to reduce or repay their mortgages." The total of mortgage advances of all kinds for the year ended March 31, 1946, was only £474,704.

However, the Public Trust Office is an important organised source of long-term credit with a clearly-defined loan policy and with branches throughout the country ready to assist and advise farmers on farm loan policy. Loans are granted for periods of 10 to 30 years and regular instalments of interest and principal are payable. Interest is charged at 4½ per cent. on amounts of £1000 and under and at 4¼ per cent. on amounts over £1000 but under £2500. For loans over £2500 the rate of interest is 4 per cent. There is provision for a five-yearly readjustment of interest rates. No loan may exceed two-thirds of the value of the security as deter-

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(3) Belshaw in "Agricultural Organisation in New Zealand," p. 159.

Young Farmers' Clubs Movement

A SPECIAL Young Farmers' Clubs Supplement published monthly and issued with the "Journal of Agriculture" to all active members of Young Farmers' Clubs contains reports of Y.F.C. activities, including monthly meetings of clubs and articles and news of value to members. Other persons interested, provided they are subscribers to the "Journal," may obtain copies of the supplement, post free, on application to the Dominion Secretary, N.Z. Federation of Young Farmers' Clubs (Inc.), P.O. Box 3004, Wellington.

mined by a special Government valuation. Repayments are based on the following table:—

Period of Loan		Annual Commitments		
		On £100 at 4½ per cent.	On £100 at 4¼ per cent.	On £100 at 4 per cent. (approx.)
10 years	..	12 10 6	12 7 8	—
15 years	..	9 4 10	9 1 8	8 18 8
20 years	..	7 12 8	7 9 6	7 6 3
25 years	..	6 14 2	6 10 8	6 7 4

The total payment on a loan of £100 for 10 years at 4½ per cent. amounts therefore to £12/10/6 × 10 = £125/5/-.

Mortgages come up for review periodically. When considered advisable properties are inspected to see that the security is unimpaired and that maintenance and topdressing are carried out. "The careful oversight of securities not only safeguards the interests of those whose estates it controls but also should reflect in the long run to the advantage of the rural community" (4). Though most loans are subject to sinking funds, the trustee also grants flat mortgages for a 5-year period under otherwise similar interest rate and valuation conditions.

(d) **Other Agencies:** (i) **The Land Settlement Board** (Lands and Survey Department) may make advances to Crown tenants on undeveloped land for the purchase of livestock and improvements, including buildings. Advances are secured by first mortgage on the land. A few loans were made under this provision during the financial year 1944-45, but the amount involved was unimportant.

(ii) **The life insurance companies** have £12,500,000 secured on real estate, both rural and urban. Of this total £5,000,000 is held by the Government Life Insurance Office, which makes loans available on terms similar to those of the Public Trust Office. Insurance offices are said generally to prefer gilt-edged marketable securities or easily-handled large investments. The bulk of their funds are therefore invested in Government or local body securities, while many of their property mortgages are other than farm mortgages. It is most unlikely that rural mortgages exceed £5,000,000.

(iii) **Banks:** There are five trustee savings banks in New Zealand—at Auckland, New Plymouth, Dunedin, Invercargill, and Hokitika—the oldest and much the largest being the Auckland Savings Bank, holding about two-thirds of the total to the credit of depositors in such banks. In March, 1946, the amount held by all the banks was £27,300,000, which was about one-fifth of the amount credited to depositors in the Post Office Savings Bank. The trustee savings banks, with the advantage of their local direction and knowledge of local people, lend money on mortgage, whereas Post Office Savings Bank investments are confined to Government, local body, and London securities. The trustee savings banks, especially the Auckland Savings Bank, lend money on rural security. At March 31, 1944, £7,000,000 was in the form of mortgages, but it is not disclosed how much of this was on rural property.

Of the commercial banks only the Bank of New Zealand has special facilities devoted to farmers' long-term credit needs. The long-term mortgage branch of this bank is empowered to advance on real estate to the extent of two-thirds of the corresponding value of landed security. Up to March 31, 1946, the bank had lent only £500,000 and little of this was mortgaged on farms.

Ordinary bank advances are nominally repayable on demand, but often they may be allowed to run on for lengthy periods provided the prospects of the borrower do not deteriorate and his general liquidity is satisfactory. In this way long-term and short-term credit may be financed to some extent from the one account. But there is no specific provision for amortisation, and very adequate security in the form of land, life policy, Government stock, or personal guarantee will be required. Loans from banks or dealers (whose activities will be discussed in connection with intermediate credit) are sometimes used to finance long-term requirements pending placing the debt on a long-term basis. However, the obligations of commercial banks to depositors, their experience in the field of shorter-term finance, and outlets for funds in this field have in the past prevented them from relying on rural long-term finance as a major form of advance.

(iv) **The Treasury.** Quite apart from land survey, land development, roading, drainage, irrigation, and subdivision carried out by the State, the Treasury (and recently the Bank of New Zealand) has from time to time come to the assistance of farmers. In default of normal lending agencies it has assisted the victims of flood, snow, earthquake, or drought affecting large areas by granting loan money on special terms to assist to re-establish buildings, fences, herds, or pastures. The loans thus cover a wide variety of needs, short-term and intermediate as well as long-term.

Summary

Long-term mortgage debt held by Government Departments, insurance companies, and banks totals about £40,000,000 or nearly two-fifths of the estimated total of rural mortgage debt. This leaves £70,000,000 as the amount financed by vendors, private lenders, and friendly societies. It would seem that rural securities are not particularly attractive to many finance institutions, and even the long-term mortgage branch of the Bank of New Zealand has done little in this field. The difficulty of realising on rural securities in case of need, as compared with Government securities, and the difficulty of supervising the loans appear to stand in the way. Nevertheless, owing largely to the rate at which mortgage debt has been paid off in recent years, it appears that private lenders are relatively less important than previously. And further the "easy" position in the short-term market must tempt banks and other finance institutions into the long-term market.

It is strongly urged that borrowers should carefully study the proposals of available lending agencies and the follow-up supervision extended before deciding how to raise their long-term finance. Especially is it desirable that the long-term farm debt should be not so high in proportion to farm security value that it becomes difficult to arrange loans to finance later farm development and operation. It is wise to make provision for financing short-term debt when the long-term debt is incurred.

Intermediate and Short-term Credit

(a) **The Rural Intermediate Credit Board.** During this century the problem of intermediate credit for farming has received much publicity. The problem first appeared as one of making the assets created in the process of farm production available readily as collateral security so that funds might be raised not only on the fixed assets of land and improvements, but also, as does corporate industry, on the wealth formed during the production process. In overseas countries agencies were created which came to cater for financing the growing and movement of primary produce in the interests of orderly marketing; for the breeding of livestock; for buying farm equipment, and for making minor land, pasture, and building improvements.

Stock and chattel mortgages play an important part in this work. Stock securities involve a covenant to brand or earmark and for the stock to be described so that it is "reasonably capable of identification." The land on which they are to be depastured must be stated. The security holds good over the stock so described and also over any natural increases of that stock. The farmer may not further encumber them, change their general quality, remove from the land, or sell, except in the ordinary course of business. Sometimes provision is made prohibiting any sale without consent and stipulating on what conditions sales may be undertaken. Provision may be made for lenders to view the stock from time to time. Securities over crops apply to all crops harvested off the lands mentioned in the instrument within a period of one year.

The Rural Intermediate Credit Act passed by the New Zealand Parliament

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(4) Belshaw in "Agricultural Organisation in New Zealand," p. 160.

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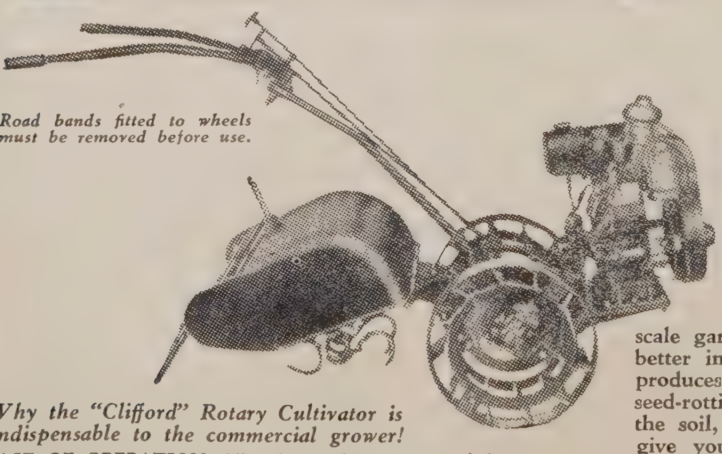

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in 1927 created a State-aided organisation empowered to make advances to farmers for periods of up to five years. The purpose of the Act was to provide, as in overseas countries, a source from which farmers might obtain finance on the security of stock and chattels as well as on their landed security.

Until October 1 last the Rural Intermediate Credit Board provided finance by making advances to co-operative rural intermediate credit associations who re-advanced to local farmers at 5 per cent. interest. Each advance was limited to association members and to ten times the subscribed capital of members with an absolute limit of £2000. At June 30, 1946, loans outstanding amounted to £63,598 held by 342 borrowers.

The board itself made advances through district sub-committees, such advances being secured by mortgage over stock, chattels, or land. Interest was charged at 5 per cent. With the establishment of ex-servicemen on the land it was anticipated that this type of loan would expand. For 1946 loans totalled £105,427 and, with repayments, loans outstanding at the end of the year amounted to £96,171 held by 145 borrowers.

With the passage of the Rural Intermediate Credit Amendment Act, 1946, the Rural Intermediate Credit Board lost its separate identity. All the functions of the board are now taken over by the State Advances Corporation, which had administered the system since 1937. Stock loans will continue to be made available to farmers either direct or through the co-operative Rural Intermediate Credit associations, but the little-used provision for discounting farmers' promissory notes is deleted.

During the 19 years of its existence the Rural Intermediate Credit Board advanced more than £1,926,000 by way of loans, discounts, and advances. Business has recently been at a low ebb as a result of "the unavoidable restriction of development and maintenance work owing to war conditions" and also as a result of the favourable credit position within the Dominion.

The competition of the dairy companies, the stock and station agents, and other dealers has had an important bearing on the board's activity. Consequently when these competitive agencies hardened their loan policies farmers (mostly dairy farmers) tended to go to the board for assistance. At no time, however, has the board provided a major supply of intermediate or short-term credit, the bulk of which is provided by the commercial banks and dealers.

(b) **Stock and Station Agents:** Stock and station agents have played a most important part in the development of sheep and mixed farming districts. With their intimate knowledge of the industry and of the standing of individual farmers with whom they deal, they are in a position to extend loans with little formality. Loans may take the form of credit on the security of a bill of sale over livestock or chattels, or they may be an advance of cash or goods, the debt being repayable from the sale proceeds of wool, lambs, or other stock.

Loans from stock and station agents usually involve interest payments at 5 to 6 per cent. Conditions of loans differ widely, but generally these firms will advance at least half of the security value of stock and plant and undertake to provide all working capital. They are prepared to take greater risks than the banks, but such loans will probably involve an agreement to buy and sell through them. They have often nursed farmers through temporary difficulty.

It is hard to estimate the total amount of credit provided, both on mortgage and current account, by dealers of this type. Obviously they provide finance for other business people beside farmers, while some operate overseas as well as in New Zealand. Farm loans may, however, reach £5,000,000 at times.

Stock and station agents and seed merchants also provide working capital to the farming community by arranging contract growing, a system which applies to nearly all seed lines—flowers, vegetables, grass and clover seeds, peas, and beans. The grower usually undertakes to cultivate for an agreed price, subject to a deduction for the cost of the seed supplied. Merchants may also provide containers. Manufacturers of tobacco will advance to growers all working and even household expenses as well as finance for the erection of kilns and will take the product on a crop or acreage basis, the payout being fixed in terms of a basic average price for all grades. In certain districts fruit and vegetables are grown on contract at an agreed price for canning, and malting barley is similarly grown on contract for the breweries.

With a contract the grower is relieved of all marketing expenses and uncertainty as to price, and he clears his produce in bulk. The merchant is assured of supplies of products which are not staple items of primary production, and the processor is similarly assured of supplies to enable plant to operate at or near capacity.

Thus dealers, by providing such equipment as tobacco kilns or glasshouses, at times assist in providing long-term credit, but generally they do not enter into this branch of the credit market to any extent, rather confining their activities to advice and mediation between borrower and lender.

(c) **Dairy Companies:** A feature of dairy factories is the development of co-operative companies. The initial funds have been usually advanced by the banks, the security comprising uncalled shares, the company's assets, or members' personal guarantee. Shares are allotted to farmers according to butterfat supplied and a deduction from receipts is made each year until the shares are fully paid.

Dairy companies are continuing to extend short-term credit to suppliers, particularly for the purchase of fertiliser and other dairy requirements.

Some companies have subsidiary concerns to finance suppliers in the purchase of stock, implements, and general requirements. These subsidiary concerns usually make advances on security of livestock and chattels up to 60 per cent. of the valuation, requiring repayment over five years with interest usually at 5 per cent. but in some cases possibly 6 per cent.

The increasing popularity of share-milking has created a fresh demand for finance by would-be farmers with small capital. The amount needed for the purchase of the herd is advanced by dairy companies, frequently on the guarantee of the owner of the land.

One dairy company has a further subsidiary concern engaged in first mortgage advances on farm lands with a paid-up capital of £100,000, its outstanding loans being approximately £163,000. Funds for investment are obtained by way of trustee debentures.

Dairy companies make to suppliers short-term advances, repayable from the current season's dairy cheques, to provide the necessary capital for any urgent work, though more frequently they provide funds to meet general expenses during the slack part of the season. By reason of the relationship between the supplier who, as shareholder, is part owner of the dairy company, and the fact that the dairy company has in hand the gradually-accumulating bonus of the supplier, advances to suppliers form a ready way to grant assistance with almost perfect safety to the company.

Pig Broadcasts

Auckland—1YA, on April 16, at 7.15 p.m., "Care of Young Pigs After Weaning," by C. W. Wallace, Supervisor, Waikato District Pig Council.

Dunedin—4YA, on April 14, at 7.15 p.m., "Pig Production in Otago and Southland," by N. McDonald, Supervisor, Otago District Pig Council.

Palmerston North—2ZA, on April 18, at 7 p.m., "Production Policy—Pork, Bacon, or Both?," by L. L. Marsdon, Supervisor, Wellington District Pig Council.

Napier—2YH, on April 10, at 7.15 p.m., "Losses From Live to Dead Weight," by H. Hopkins, Supervisor, Tairawhiti District Pig Council.

In times of financial stress the dairy company or subsidiary is called upon more and more to grant assistance in this way. As they in turn obtain the funds for lending from their bank (except when prompt payment for dairy produce enables liquid funds to be available), assistance is tantamount to a bank advance. Indeed dairy companies frequently ask their banks to advance to suppliers on the guarantee of the company.

(d) **Commercial Banks:** The most important suppliers of intermediate and short-term credit are the commercial banks. They also provide credit for farmers indirectly through the stock and station agents and the dairy companies. The table below illustrates the importance of the commercial banks in providing farm finance.

The value of land, buildings, plant, and machinery for industries allied to primary production is only about one-thirtieth of that in farming proper, yet advances by way of bank overdraft have reached half of those to farmers. This means that a greater proportion of farm debt tends to be in a form which cannot easily be liquidated otherwise than by sale of the farm. This fact explains some of the difficulties associated with the problem of raising funds for farm purchase and operation and also some of the financial dangers farming entails.

The increase in advances to freezing works and meat companies revealed by the table is associated with an increase in the cost of materials from £19,000,000 to £23,000,000 in the period 1939-40 to 1943-44 and with increases over the same period of £1,000,000 in both wages bill and value of plant (5). There were also temporary accumulations of meat during the war, despite little increase in the numbers of livestock slaughtered. Bank advances to dairy factories reached a peak in the years 1939 to 1941. Dairy factory payouts for butterfat, labour, and materials and the value of output were highest in the seasons 1940-41, 1941-42, and 1944-45 (the latest season for which statistics are available). Short-term advances to farmers have been well maintained and farm debt is now in a more liquid form than previously (6).

All bank advances to farming interests are of a highly-seasonal nature and the banks provide a very flexible means of finance. Dairy farmers are most heavily indebted in the early spring, pastoralists in December (about shearing time), and intensive sheep farmers in the summer, just as the annual draft of fat lambs starts to move. Similarly both arable and mixed farmers are most heavily indebted in midsummer. Farmers depending mainly on grain and sheep show the greatest variation in indebtedness. Returns come in irregularly. At the point of heaviest indebtedness in the summer these farmers may be overdrawn, on the average, one-third more than they are in late autumn. Dairy farmers naturally show least variation in debt to the banks.

Industries allied to primary production, particularly freezing works, show a greater variation throughout the year than farmers. In 1941, for example, the March overdraft of freezing works was £7,360,000; by September it had fallen to £1,150,000. Similarly woollen mills and other industries allied to primary production have to overdraw most heavily in the first quarter of the year when the new season's inventories are coming to hand. Stock and station agents, a step nearer the grower, have high points in advance of this—toward the end of the year.

In arranging a bank advance the normal procedure is for the customer to approach the bank. Government securities, life insurance policies, time deposits at the bank, guarantees, chattel securities, and first, or more rarely, second mortgages on land, are eligible securities. The value of the security, the personal and business character of the individual, the purpose of the loan, and the general banking situation will determine whether the bank will decide to grant an overdraft and, if so, to what limit. Advances fluctuate in the normal course of business.

Banks will not foreclose on securities to reduce overdrafts except in exceptional circumstances. Credit is preferably restricted by tightening up on new advances and reducing overdraft limits as loans are paid off in the normal course of business. The provision of deposit facilities is a most useful connection with prospective borrowers.

At present banks are in a position to advance to producers against any anticipated expansion of production of marketable goods and services. Their reserves at the Reserve Bank are high, their overseas funds are adequate, and their deposits are far in excess of advances. But an advance for any scheme which is not considered to have a reasonable chance of success, no matter how adequate the security, will not be forthcoming. Especially now when the danger of inflation is so great it would be most imprudent to advance for any enterprise likely to create great immediate pressure on prices. Rationing of loans is therefore usual, especially as overdraft rates, on which the agreed minimum is 4 per cent. and maximum 5 per cent. (according to the size of the account and risks involved), are fixed by arrangement between the bank and the Government. High interest charges could formerly choke off undesired loans to some extent.

Overdraft provides a convenient and cheap form of working capital. Then there is the advantage of the passbook and the cheque, the latter providing a safe and convenient means of payment. The customer is in these ways helped in the preparation of accounts, as he is able to keep a close watch on the financial side of the business, while the interest of the bank or dealer in the safety of the loan will ensure the availability of advice at all times.

The loan fluctuates and interest is paid only on the balance outstanding daily. This means a saving, for a fixed loan would have to be large enough to cover the point of heaviest indebtedness. Working on an overdraft may enable the farmer to invest funds in the development of the farm that would otherwise have to be used to cover annual commitments.

TABLE III

Trading Bank Advances to Farmers and Allied Industries (£ millions). End of March.

1. Farmers:	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
(a) Mainly dairy	4.70	4.98	5.00	4.88	5.12	5.40	5.10	5.60	5.76	6.42
(b) Mainly wool	5.42	6.06	6.35	5.77	5.55	5.27	5.66	5.77	6.26	6.48
(c) Mainly meat	1.95	2.19	2.26	1.93	1.83	1.91	1.70	1.69	1.77	1.37
(d) Mainly agric.	.32	.38	.49	.33	.44	.31	.37	.31	.40	.44
(e) Mixed ..	4.14	4.50	4.35	4.18	4.14	4.29	4.19	4.03	4.54	4.59
	16.53	18.11	18.45	17.09	17.08	17.18	17.02	17.40	18.73	19.30
2. Industries allied to primary production:										
(a) Dairy coys.	1.25	1.73	2.60	2.08	2.31	1.65	1.34	.98	1.16	.83
(b) Freezing works	.92	1.74	2.56	3.31	7.36	6.46	5.16	5.70	7.01	7.76
(c) Other (including woollen mills) ..	1.97	2.75	2.09	1.96	2.06	1.62	1.87	1.63	1.90	2.35
	4.14	6.22	7.25	7.35	11.73	9.73	8.37	8.31	10.07	10.94
3. Stock & Station Agents:	.64	1.35	1.36	.68	.53	.49	.54	.84	.97	.75
TOTAL Farming & Allied Industries	21.31	25.68	27.06	25.12	29.34	27.40	25.93	26.55	29.77	30.99

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(5) Storage capacity was increased in 1941-42, when the value of plant and buildings rose from £5,460,000 to £6,200,000.

(6) At the moment short-term and intermediate debt appear as about one-sixth of the long-term farm mortgage debt.

Banks will also discount bills when a farmer is working on a consignment basis.

Settlement of Ex-servicemen

Generous State assistance is available for ex-service men and women. Tenures were covered in a previous article (7). But in addition the Rehabilitation Board makes available loans for the purchase of farm properties, the limits being as follows:—

	Limit to Loan. £
Dairy farms, going concern	5,000
Sheep and mixed farming, going concern ..	6,250
Stock only	2,500

The rate of interest charged is 2 per cent. for the first year and 3 per cent. thereafter.

The volume of loan business is expanding rapidly, farm loans granted up to the end of October, 1946, numbering 3109, involving £11,843,897.

Besides training approved ex-servicemen on its own farms or on Lands and Survey Department blocks, the board also subsidises training with private farmers according to the following scale:—

	Payments by Farmer (Including Board & Lodging).			Board Subsidy.		
	£	s.	d.	£	s.	d.
1st six months	2	10	0	2	10	0
2nd six months	3	7	6	1	15	0
3rd six months	4	0	0	1	7	6
4th six months	4	2	6	1	7	6

Single full-time student trainees at agricultural colleges receive £2 a week in addition to board, lodging, and college fees; married men receive £4 a week.

In this work the provision of adequate finance for the purchase of a farm is seen as only one step in the problem of farm operation. Preparation starts with training adapted to market conditions and types of farms becoming available, for market conditions will help determine what kinds of farms are profitable. It continues with the finding of a farm of suitable type, size, and carrying capacity at an approved price or rental, and finishes only when the farmer is firmly established on his property and in a position to carry out needed improvements and livestock and cropping programmes.

Conclusions

The State is at present active in the purchase and leasing of farms for ex-servicemen. Their settlement is also absorbing the attention of the long-term credit market. Some features of this scheme have been dealt with in the preceding section, but of general interest is the relaxing of security margins; instead of advancing up to a fixed proportion (two-thirds) of the security value, a maximum is set for loans for different types of farming, the loans sometimes equalling 100 per cent. of the finance needed to purchase land and stock.

The starting point in the consideration of future settlement is that freehold is now the most important tenure and little virgin land is left. The result is that the demands on the long-term credit market have increased, and to help ease the situation the small farms legislation was placed on the Statute Book to make provision for leasing farms on terms suitable to farmers who lacked the necessary money or credit to take up farms under other tenures. Without some such provision and in the absence of lease with right of purchase agreements, many young and energetic farmers would find it extremely difficult to get a farm except one too small or too low producing for efficient management.

For a farmer originally without finance and not the son of an established farmer the road to a freehold farm of average output and efficiency has often been long and difficult. The first stage on completion of education and pre-farm training is work as a farm hand. The next distinct step is promotion to farm manager or, in dairying, to sharemilker. An alternative would be the purchase or rental of a part-time holding within the limits of available financial resources, supplementing the income thus obtained with wages from work for neighbouring farmers. But this possibility is usually confined to intensive farming districts, and it implies sufficient savings to finance the necessary deposit or rent on the holding, the transfer expenses, the purchase of farm implements, purchase or rent of home and furnishings, and provision of working capital until returns are shown. To graduate from such a holding or from the status of farm manager to the position of owner-operator of a full-time farm would require as a minimum £1500 to £2000 at present. And this is not the end, for a farm plus home, furniture, equipment, and stock which could be bought with such a deposit might not provide full scope for the exercise of management ability.

The question then becomes one of (a) improving the productive capacity or layout of the farm; (b) saving sufficient out of current income to finance the purchase of a more productive unit; or (c) changing the make-up of crop or livestock products (for example, expanding small seeds production at the expense of grazing). The difficulties facing the farmer are increased because, on account of the strong demand by those with limited financial resources, the low-producing or run-down type of farm is typically over-valued as compared with higher-producing units in the same type of farming; though, as against this, the improvements, buildings, and stock, and seems therefore more adaptable to economic depression. It also provides useful schooling in the economics of management.

Solution (a) is indicated when the farm is in a run-down condition (8), or where the lay-out is wasteful of time, effort, and working expenses. Many hill-country farms are in this state. In this case, as with (c), the use of intermediate credit is appropriate. In this connection consideration might be given to extending the term for this credit from 5 years, as at present, to 10 or even 15 years. (In this work of improving productivity there seems also a definite place for forestry and soil conservation loans, which the Americans have pioneered.) If borrowing is not undertaken, there is often a noticeable tendency to improve the farm, sometimes at the cost of great physical and nervous strain, to the neglect of current operations. This step involves saving in the form of possible income forgone.

Solution (b) is relevant to farms where development and maintenance work has been faithfully carried out. This solution will usually imply subsequent repurchase of a larger property whereas the carrying out of farm improvements along the lines of (a) may finally result in a property and level of production which are entirely satisfactory. The farm could then be retained. Judging by statistics of land transfers, popular and common practices are such accumulation of savings and of equity in a property in order to finance the purchase of a more efficient unit. Lack of farm maintenance as distinct from (a) may result, however.

Though lending agencies are always keen to back farmers who have proved their worth, the efficiency of the process of wedding the farm to the most able and keenest farmer offering might be increased if a higher proportion of the security value of a property were sometimes advanced. It has been found necessary to do so in cases of the settlement of ex-servicemen. It would reduce the period taken up in climbing the farming ladder and enable the amalgamation of some "uneconomic" holdings. In this connection the experience gained by the State Advances Corporation in the settlement of servicemen will be of ines- small farm has lower proportionate overhead costs in the form of land and

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(7) "N.Z. Journal of Agriculture," Vol. 71, No. 3, p. 255, "Farming in New Zealand: Land Legislation," F. R. Bray.

(8) This is not meant to imply that any increase in the level of output is sure to be profitable. Perhaps too often farmers take up this position. Obviously consideration should be given to the profitability of different levels and kinds of production. Thus it may be better to try for a larger farm (procedure b) or to change over to different proportions of products (procedure c) than to increase existing levels of production, for example the numbers of sheep carried. This is so even if many family farm costs are relatively fixed and do not vary much with variation in levels of output.

RURAL CREDIT . . .

timable value in the future of the rural long-term credit market.

Any easing of security limits, however, would entail close co-operation between farmer and lender in the planning and budgeting of farm development and operation, at least until part of the debt had been paid off. It would also entail approval of the price paid for the farm. Otherwise any easing of restrictions on advance of credit could lead to gross inflation of farm values. It would mean close consultation between agencies interested in farm finance, particularly with regard to ensuring that necessary working capital was available. But the greater stability which the use of guaranteed and scheduled prices envisages makes the position of lending agencies more secure by reducing the risks to which they are exposed by price fluctuation.

Supplementing the other ways of obtaining a farm, there is State repurchase, which has played an important part in the settlement of ex-servicemen, particularly as the State knows what farms are offering for sale. But as with the easing of security limits, there is a danger of inflation of land values when the State becomes a strong competitor for farms. At present this danger is averted by the Land Sales Act. State repurchase could, however, prove a useful weapon to help counteract the effects of an economic recession.

To some extent the various ways of obtaining a farm are typical of different types of farming. Thus the stages from farm hand, to manager, and then to a farm of one's own are peculiar to sheep farming. In dairying, sharemilking is substituted for farm manager, while in intensive mixed farming of small holdings, orchards, and market gardens the part-time holding is found as the intermediate step. In the past State repurchase has been used mainly in the transfer of land from farming of one type to another of a more intensive nature; for example, from pastoral to fat lamb or dairy farming. The scope for this type of subdivision is now limited and in the future it might be a question of amalgamating holdings in numerous cases.

A farm hand, shepherd, sharemilker, or manager markedly above average ability in running a farm will nearly always end up by obtaining a farm. There are always vendors, solicitors, stock and station agents, and banks willing to back such a man. But measures taken as outlined above should make the road easier from farm apprentice to owner, part-owner, or lessee of an improved farm, and there is not a great deal of difference between positions of owner or lessee, provided the tenant has security of tenure.

Broomrape Invades Cowgrass In Nelson District

By D. M. E. MERRY,

Instructor in Agriculture, Nelson.

BROOMRAPE *(Orobanche minor)* is a common parasite of red clover, and its presence on several areas of cowgrass usually closed for seed on the Waimea Plain, Nelson, is causing some concern. So thickly has broomrape established itself in some parts that clover plants are dying; elsewhere its attack is reported to have seriously reduced seed yields.

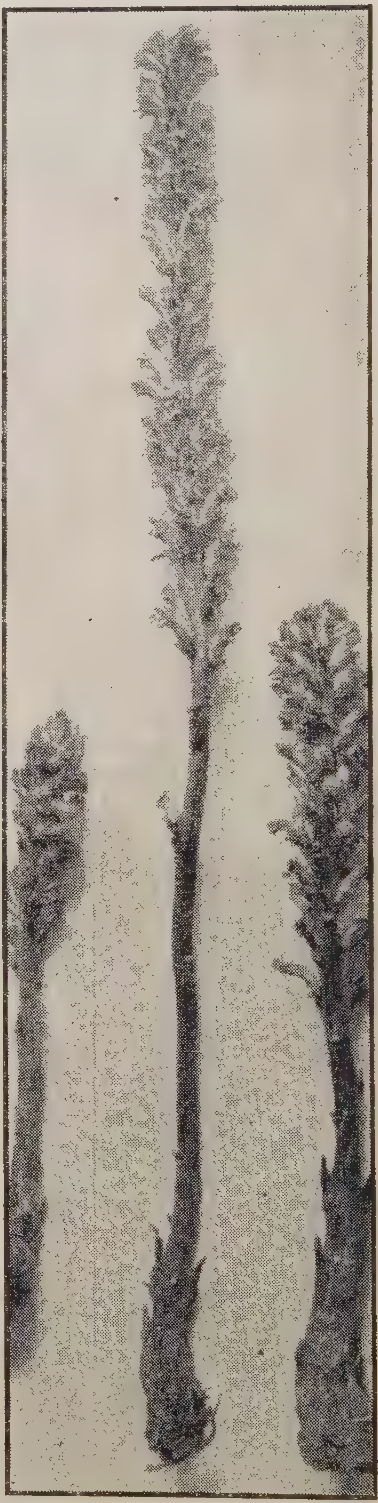
BROOMRAPE first appears as a fleshy, creamish-brown stem as thick as or thicker than a fountain pen and grows from 12 to 18in. high. It is a true parasite, having no green leaves but depending solely on finding a suitable host plant to which it attaches by coarse roots. The lower portion of the stem is often bulbous. It is reported as a parasite on red and white clover, lucerne, sweet peas, parsnip, dandelion, catsear, hawkesbeard, aster, and several other plants. Broomrape appears to be fairly common in New Zealand, particularly in the Auckland district.

The single, erect stems bear a number of creamish, bell-like flowers which set myriads of fine, dust-like seeds. These germinate like the seed of normal plants and send out a root, but unless a suitable host is at hand, the seedling dies. In the affected areas in Nelson several of these fleshy stems may be found attached to practically every red clover plant.

Precautions Against Spreading

Some mystery surrounds the means of the spread of broomrape, especially when none has appeared previously in the area sown and the red clover seed has not come from an infested paddock. The first step toward minimising its spread is to sow only machine-dressed seed on a clean paddock. Feeding out hay from a broomrape-infested crop to other paddocks probably assists its spread, as does the wind, and grazing animals might carry the spores from paddock to paddock.

Like some other weeds troublesome only seasonally, broomrape has been seen in Nelson to parasitise the one area year after year. One farmer inspects his clover paddocks early in the season and pulls and burns all broomrape showing then and later. Though laborious, this task seems to have been justified by the results.



Typical broomrape plants.

GROWING OF DAHLIAS

NEW Zealand conditions seem to suit the dahlia, and few herbaceous plants give a better display of flowers for the relatively little trouble required to grow them. This article by J. P. Hudson, Horticulturist, Wellington, deals with the culture of dahlias, which, he says, should be featured in every home garden.

[Photo News Ltd

DAHLIAS are said first to have created an interest in Europe as a possible food plant, and were at one time cultivated in France for their tubers, which were used in the same way as potatoes. They have a bitter flavour, however, and soon went out of favour as a vegetable.

At that time the flowers were relatively poor and hidden among a mass of leaves, but plant breeders have long since improved on the original types until nurserymen can now offer hundreds of named varieties in almost every conceivable combination of whites, yellows, mauves, and reds, with flowers of many shapes borne well clear of the foliage on plants which range from 18in. to 7ft. or more high. Dahlias are ideal for planting by themselves, and are also most valuable for planting in beds or in herbaceous and mixed borders where, blooming continuously for probably longer than any other herbaceous plant, they extend the season of the borders well into the autumn.

Choice of Situation

The dahlia is a sun-lover and produces the sturdiest plants and greatest abundance of bright flowers when planted in full sun. Dahlias will flower in partial shade, but the stems grow long and weakly and the flowers are of poor quality.

Dahlias will grow in almost any type of soil, but do best in a deep, well-drained loam, sandy rather than heavy. Other soils can be made more suitable for dahlias by the treatment which will be described. The deep alluvial soil found on many of the plains seems ideal for dahlias, as their roots can extend deep into the soil, where they can find an adequate supply of moisture even in times of drought.

Though dahlias will stand quite a lot of wind without being damaged, if they are staked, they should preferably be sheltered to some extent from the prevailing wind. If fully exposed they are not easy to support properly without using an unsightly forest of stakes and complication of ties, and violent winds may scorch flowers and foliage.

Preparation of Soil

Garden plants vary in their need for water. Some, like the succulents, can exist for weeks or even months in a perfectly dry soil; others, such as the geranium, seem quite content to flower and flourish in an arid place in the garden. These two are examples of plants which are specially adapted, by their structure or habit, to growing in regions where there are often long spells of dry weather.

The dahlia, on the other hand, has little power to resist droughts. If its roots lack water, the plants soon stop growing, wilt, and shrivel. A regular and adequate water supply is essential for first-rate results.

One of the best ways of ensuring that dahlias never suffer from lack of water is to plant them on ground that has been deeply dug the previous winter. Deep digging not only allows winter rains to soak well down into the soil and helps the surplus to drain away, but enables roots to spread deeply into the soil in search of this moisture. Dahlias often respond better to deep digging than to a dressing of organic manure.

Fertilisers

There is little need to apply heavy dressings of animal manures to ensure a good display of dahlias unless the soil is very sandy and poor, when the manure will help to hold moisture as well as provide plant foods; but liberal dressings of compost, green crop, stack bottom, or other well-rotted organic material are always helpful in improving the condition of the land by making heavy soil lighter, more open, and better aerated, and by making light, sandy soils more retentive of moisture. In addition, a dressing of 2oz. of blood and bone and 1oz. of superphosphate a square yard should be turned into the soil at the time of digging in normal soils. If the soil is poor, the dressing may be increased to 3oz. of blood and bone and 2oz. of superphosphate a square yard.

But these fertilisers do not in any way replace the dressing of bulky organic manures already referred to. They are, rather, supplementary to them, supplying plant foods while the bulky material improves the soil condition.

If huge show blooms are required a generous dressing of animal manure dug into the ground during the late winter is essential for flowers of exhibition size and substance. A pound and a half of rotted cow manure a square foot, equivalent to about 30 tons an acre, is the usual dressing for this purpose. It is sometimes suggested that a forkful of manure should be placed at the bottom of a hole dug for each plant before planting, but general opinion is that it is better to work the manure into the whole area during the latter part of the winter and thus encourage the dahlia roots to develop throughout the soil.

If a border is not required in the winter for other flowering plants, a cover crop may with advantage be grown during the winter and turned in in time to settle before dahlias are ready to be planted. A better plan is probably to grow the green crop elsewhere, cut it, and cart it on to the dahlia bed to be buried when it is dug in the winter—a case of robbing one part of the garden to feed another, perhaps, but a practice which will be repaid in the quality of the dahlias

Propagating New Plants

The two methods by which dahlias are usually increased are by cuttings

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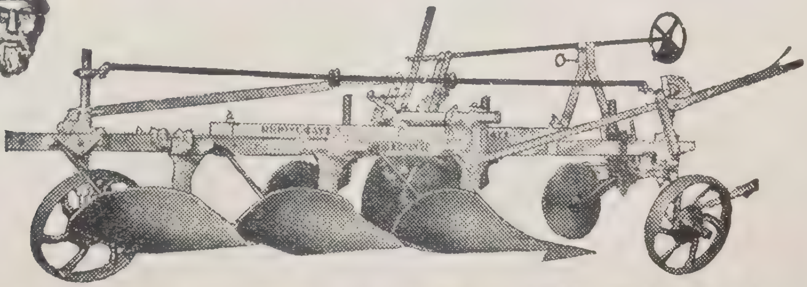

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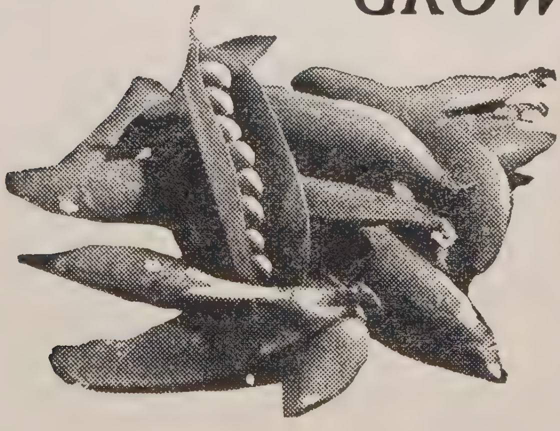

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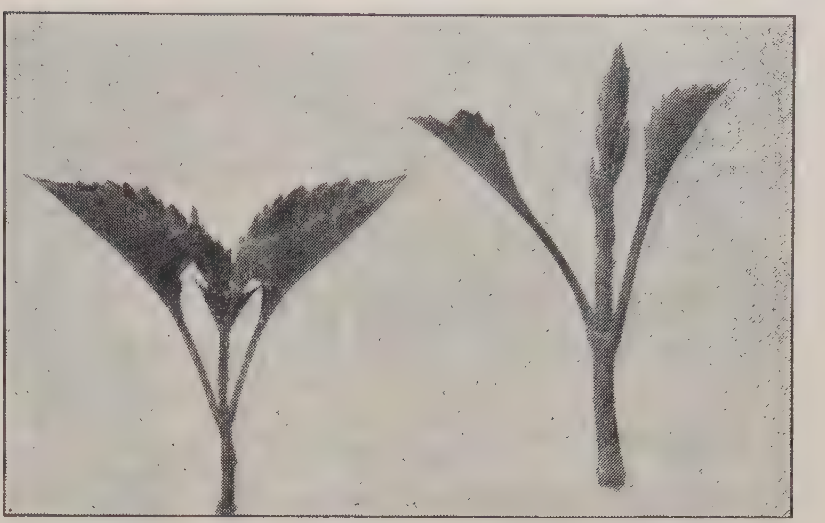
or by division and replanting of the previous year's root. There is something to be said for both methods. Generally, much earlier flowers and larger plants can be produced by replanting the old roots, but cuttings ultimately produce better plants which have finer flowers and prolong the flowering season well into the autumn. A very much larger number of new plants can be propagated from a given number of roots by the use of cuttings than by the division methods, and cuttings are universally used by nurserymen.

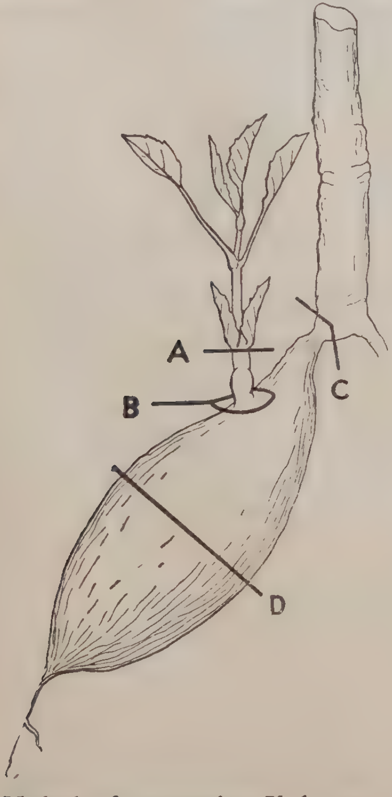
Whichever method is to be practised, the starting point is always the previous year's root which has been lifted and stored through the winter, as described later.



Dahlia cuttings prepared for insertion in a frame by cutting them off just below a pair of leaves and then trimming the lower two leaves off. They should be inserted up to the place where the first pair of leaves join the stem.

Rooting of Cuttings

Those from which new plants are to be grown will be wanted, rooted and ready for planting, by October or November, according to the district. To achieve that, the previous year's roots should be put in boxes about August with a little damp ashes, leaves, or soil packed round the sides **but not over the top of the tubers,** and taken into a light place in a frame or glasshouse. If the upper part of the tuber, where the buds grow, is covered with soil, the new shoots are usually large and sappy and make poor cuttings. Much more satisfactory cuttings are produced if the top part of each tuber is left exposed to the air. Water them lightly to settle the soil or ashes round the roots, and subsequently sprinkle them with water from time to time to keep the soil round the tubers just moist but not sodden.



Methods of propagating: If the new shoot is cut off at A, leaving a stump of shoot, it can be rooted easily and more shoots will grow from the stump to provide further cuttings later. If only one cutting is required, it can be cut off at B with a heel of tuber attached; taken thus the cutting will root rather more easily than if cut at A. Alternatively the whole tuber can be severed from the crown at C and planted out complete, or potted up. If put into a pot, the tuber will probably have to be reduced in size by cutting it off at D.

New shoots will soon start to appear, arising from buds on or near the stem end of the tubers. When these shoots are not more than 3in. long they should be cut off cleanly with a razor blade, either with a small piece of the old tuber attached to each or just below the bottom pair of leaves. In the latter case a short stub is left on the tuber from which more cuttings soon appear, whereas if the cutting is taken with a piece of tuber attached, no further shoot will grow from that place, as no buds are left from which new shoots can develop.

If only a small number of cuttings is required, it is best to take them with a heel of old tuber, especially if they are to be rooted in a cold frame, as these cuttings root rather more readily than those with no heel. Commercial growers, of course, leave the stub on the tubers to produce a further supply of cuttings. The cactus types of dahlia usually produce many buds on each tuber, but some of the show varieties produce very few cuttings, and in those cases it is important to leave the stub of each shoot if more cuttings are wanted.

Where a stub has been left on the tubers the base of each cutting should be trimmed off just below the bottom pair of leaves with a razor blade or very sharp knife. The bottom pair of leaves should then be cut off, if they are green and have unfurled, and the cuttings inserted 1in. deep and 3in. apart in boxes or pots of light, sandy soil and put in a frame or glasshouse to root.

Care to Prevent Flagging

Professional propagators root dahlias in a glasshouse where moist conditions and a minimum temperature of 60 degrees F. can be maintained, in which circumstances the cuttings often produce roots in less than two weeks. In the home garden cuttings can be rooted quite well in a cold glasshouse or a frame, but roots form more slowly at the lower temperatures and greater care has to be taken to prevent serious flagging of the leaves before the cuttings are rooted. The cuttings should be watered in with a can fitted with a rose and then covered with a single sheet of newspaper to keep off the direct rays of the sun. Close the frame or glasshouse to keep out cold winds or frost, and damp down the soil round the cuttings daily to maintain, if possible, a moist atmosphere around them to prevent wilting. When the first roots have formed—evidenced by the brighter appearance of the leaves in the centre of the shoot—the newspaper

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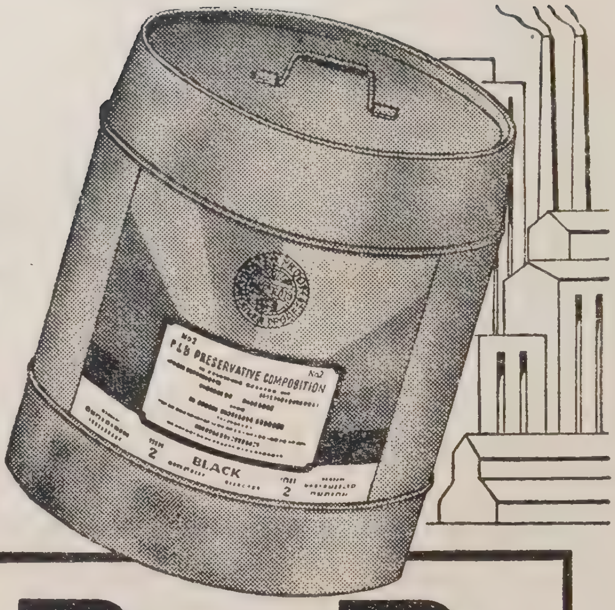

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should be removed, as leaving it will result in the cuttings growing spindly.

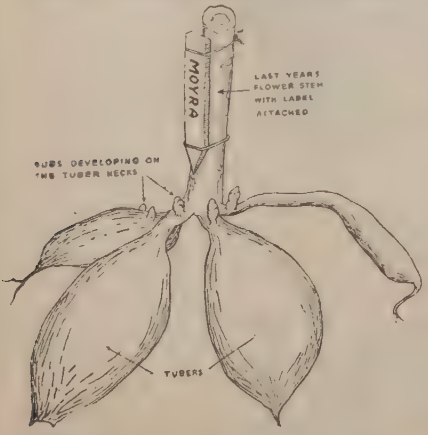
As soon as the cuttings have rooted they can be planted out into the garden or, preferably, potted on. They should not be left in the cutting box or pot, where they will soon become drawn and spindly and suffer serious mutilation of the roots when later taken out for transplanting. Plants which have been propagated in a warm glasshouse must be properly hardened off before they are planted out of doors by giving them gradually cooler conditions. Soft, glasshouse-grown plants put straight out into the open would be seriously checked if not killed by the first cold wind.

Dividing Previous Year's Roots

Good dahlias can be grown from pieces of the previous year's roots, and that is a popular way of increasing dahlias in the home garden, especially where there is no glasshouse or frame in which cuttings can be rooted. The method is quite easy if it is understood that planting a dahlia root without at least one bud is useless.

The roots should be half buried in damp soil in a light, warm place in a glasshouse, frame, or window about a month before they will be needed for planting. The dormant buds on the tuber necks start to swell, and by planting time can easily be seen. Every root with one or more buds on it will produce a new plant, but roots which have no buds are useless and are best thrown away. Just before planting, each root should be carefully divided with a knife, making sure that each piece bears at least one well-developed bud. The selected roots can then be planted out into the border in the normal way.

To divide completely dormant roots is unsatisfactory, as the buds cannot always be seen and it is difficult to make sure that every piece of root has at least one bud.


MOYRA
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BUDS DEVELOPING ON THE TUBER NECKS
TUBERS

When lifted in early winter no buds show on the necks of the tubers. When the roots are stood in a warm place in early spring the buds soon develop and new plants can then be propagated in one of the various ways described.

Earlier flowers can be secured by bringing the roots inside in August or September, leaving them until the buds develop, dividing them as described, and then potting the selected roots so that well-grown plants with developed root systems can be produced by planting time. If the roots are large and unwieldy, the lower part of each may be cut off before they are potted up.

Other Methods of Propagation

If it is not desired to increase the number of plants, each of the previous year's roots can be planted out intact. The soil should be carefully drawn away from the root when it starts to grow and most of the new shoots removed at the tuber. Some growers advocate leaving only one shoot, and certainly no more than three should be left to each plant.

Dahlias can easily be grown from seed, but seedlings do not come true to type. Named varieties can be propagated only by some vegetative method such as cuttings or division of the old tubers.

Mixed bedding dahlias are sometimes grown from seed, treated like half-hardy annuals, and planted out when there is no further risk of frost. The seedlings flower well the first year, after which roots of the best plants can be kept for propagation in the next year.

New varieties of dahlias are usually raised from seed produced as a result of carefully-controlled pollination by the breeder. However, there is always a possibility of a good new type being produced from any batch of seedlings.

Planting Out

As dahlias are frost-tender they should not be planted out until all danger of frost is past. In mild, frost-free districts it may be safe to plant them out in September or early October, which will provide an early crop of flowers, but in colder districts it is wiser not to put them out until November. Later plantings may be continued, if desired, until the New Year; that is sometimes necessary where dahlias are used to follow early summer bedding schemes.

The distance apart at which dahlias should be planted depends on the variety and fertility of the soil. Bedding or mignon dahlias should be planted 18in. to 2ft. apart, medium decorative and cactus dahlias 3ft., and giant decorative and show varieties 4ft. In each case a slightly greater distance should be allowed in the more fertile types of soil, but it is a mistake to plant dahlias too far apart if a massed flower effect is required.

A rooted dahlia cutting ready for planting or, preferably, potting on to produce a well-grown plant ready for planting later.

Stout stakes are required to support the medium and tall types of dahlias. The stakes are best placed one at the rear of each plant in sheltered places, two to a plant in windier places (one at each side), and three (one to the rear and one on each side toward the front of the plant) in the most exposed places. The best type of stake is sawn jarrah, which will last for years, but they are now both scarce and expensive. Pointed manuka stakes are cheaper and quite satisfactory, but not so sightly. Stakes painted with a good, dull green paint last longer and are less conspicuous.

Stakes are best driven firmly into place **before** the plants are put out, but the border then looks "all stake and no plant" until the dahlias have made substantial growth. If for that reason objection is taken to staking before planting, the young plants can be supported by tying them to short, light sticks until they are about 1ft. high, but the permanent stakes should then be put in without further delay.

It is too late to stake plants when a gale has flattened them to the ground. In a well-staked border all the plants are secure yet no stakes can be seen when the plants are fully developed—a high standard, but one at which the home gardener should aim.

When planting dahlias a hole should be dug for each plant sufficiently wide

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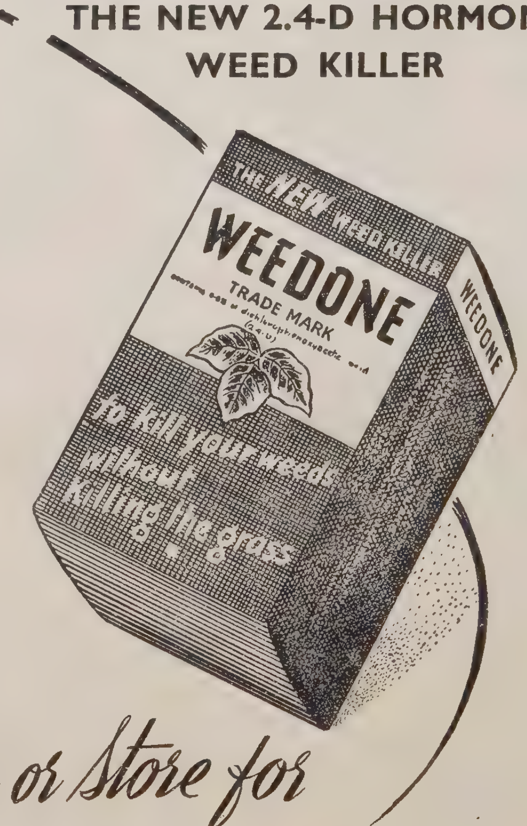

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and deep to enable it to be put in with the top of the tuber (or surface of the ball of soil if a rooted cutting is being planted) 2in. below the original soil level. Planting should be firm, but all the soil should not be returned to the hole at once. The plant should be left in a saucer-shaped depression to facilitate watering, if that is necessary, after planting. The depressions gradually fill up during the season as the bed is hoed.

If plants received by post are wilted when they arrive, they should be stood for a few minutes in water deep enough to cover the ball of soil to ensure that it is thoroughly soaked. Then stand them in a shady place until the leaves are firm and rigid, after which they can be planted out. If the plants are put in a sunny position while wilted, the original leaves never recover but gradually go yellow and die, delaying the establishment of the young plant.

Feeding and Watering

For ordinary garden display little feeding of dahlias should be necessary if the soil was properly prepared before planting. When large show blooms are required a stimulant will be necessary to ensure maximum size and quality of flowers, and this is best applied by watering at intervals with weak liquid manure and applying a topdressing of 2oz. of blood and bone and 2oz. of superphosphate a square yard, thoroughly watered in, when the plants have nearly completed their growth and the flower buds can be seen. If the foliage is yellowish green or growth is unsatisfactory, a teaspoonful of sulphate of ammonia spread evenly over the ground for a foot all round each plant and thoroughly watered in should bring about an improvement; but quick-acting nitrogenous manures like sulphate of ammonia should be used only with caution, as an overdose can lead to very unbalanced growth.

If the soil was adequately prepared and plenty of organic material worked in, watering should not be necessary other than for the application of liquid manure or washing in of topdressings, which should never be applied to dry soil. In fact, too much water may be detrimental, as it can produce soft, leafy growth at the expense of the blooms. On the other hand the soil should never be allowed to dry out to the point where the foliage becomes flabby and starts to wilt. If it is necessary to water at all, the bed should be given a very thorough soaking and the surface broken up with a hoe shortly afterward to prevent it from caking.

The ground around dahlias should be hoed regularly to keep the surface loose and prevent weeds from growing. A surface mulch of compost, leaves, and lawn mowings applied after planting will help to keep the soil moist and avoid the necessity for watering.

As the plants grow they should be tied in to the stakes in such a way that they are supported but the shoots are not drawn together into an unnatural bunch. Strong raffia can be used, but binder twine is probably better. Neither is sightly, and there is a need for some strong but inconspicuous type of green tying material.

Thinning and Disbudding

As the plants develop some thinning of the shoots may be necessary, especially where extra large blooms are required, but dahlias grown for garden display do not usually need much thinning. If the plants are grossly overcrowded, the thinner shoots should be removed altogether. Most exhibition blooms are grown on plants with a single stem, the centre of which is pinched out when it is about 8in. high.

For flowers of maximum size all the side buds should be removed when the terminal flower bud is about 1in. in diameter, provided it is a normal bud. If the terminal bud is misshapen or abnormal, it should be removed and one of the other buds left instead. Side buds left in this way usually swell up and open into quite satisfactory blooms. At the same time all the side shoots except the bottom two may be removed, to throw the energy of the plant into perfecting the flower bud which has been left. The bottom two shoots are left to grow and produce the stems on which the second batch of flowers will be produced. If the dahlias are being grown to make the maximum show in the garden, disbudding or removal of side shoots is neither necessary nor advisable.

It is, however, essential to remove old flower heads as soon as the petals fade and before they have time to develop seeds. Dahlias, especially the mignon varieties, are so free flowering that they exhaust themselves in seed production unless the faded flowers are removed. Prompt removal of all faded flowers does more than anything else to ensure a long succession of blooms from dahlias.

Lifting and Storing Roots

Though it is common knowledge that dahlia leaves are blackened by a few degrees of frost, it should be realised that the roots are almost equally susceptible to cold. In favoured, frost-free districts the roots may be left in the ground all through the winter and the plant treated as an ordinary herbaceous perennial; but elsewhere, or if it is desired to increase the stock, they should be lifted each year.

When the leaves and flowers shrivel in late autumn—usually not later than the middle or end of May—the stems should be cut down to about 6in. high and each plant lifted with a spade, taking care not to injure the tubers unduly, and especially not to sever the tubers from the main stem, which renders them useless. Shake the surplus soil from between the tubers, tie wooden labels with the names of the variety securely to the woody stalks, and put the roots into an airy place where they can dry off. When dry they can be stored for the winter in any place where they are protected from frost, but they do **not** require a warm place —in fact, provided the store is frost-proof, the cooler the better, as the tubers shrivel least at temperatures of 35 to 40 degrees F.

The Dahlia as a Cut Flower

It is sometimes said that the dahlia does not last well in winter. If the blooms are cut early enough, before they are too fully developed, the dahlia is a good cut flower with a life comparable to that of many other garden flowers. They should always be cut early in the morning or in the evening, and just before the flower is fully developed.

Exhibitors of dahlia flowers usually dip the bottom inch of the flower stems into boiling water for about five seconds as soon as possible after the flowers are picked. Experiments overseas throw some doubt on the efficacy of this procedure, especially with flowers taken inside for household decoration.

It was found that the blooms which lasted best were those which were put into water up to the flowers immediately after they were picked, left for an hour or two to take up as much water as they could absorb, then had the bottom inch cut off the stems under water, and were put into the vase. After two days the stems were shortened by an inch, again cutting them off under water, and the water in the vases was changed. With that treatment the flowers kept in perfect condition for between 4 and 7½ days, depending on the keeping qualities of the variety and the warmth of the weather.

Varieties Recommended

The taller, large-flowered types of dahlias are most popular with enthusiasts who wish to exhibit blooms at flower shows. These varieties are also decorative in the garden when planted toward the back of the herbaceous border or in places where their height is shown off to advantage, providing other shorter types are planted in front of them to hide their lower non-flowering parts. For the small home garden, however, the dwarf, very free-flowering types, known as bedding or mignon dahlias, are much to be preferred.

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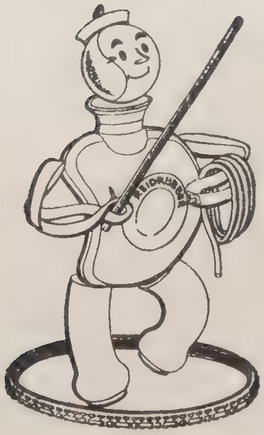

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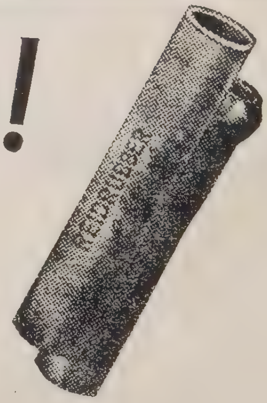

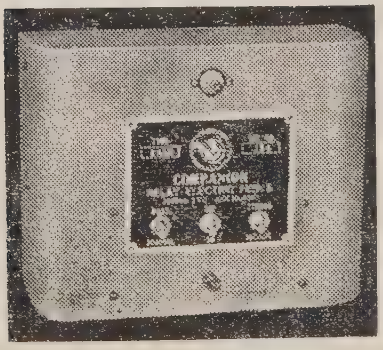

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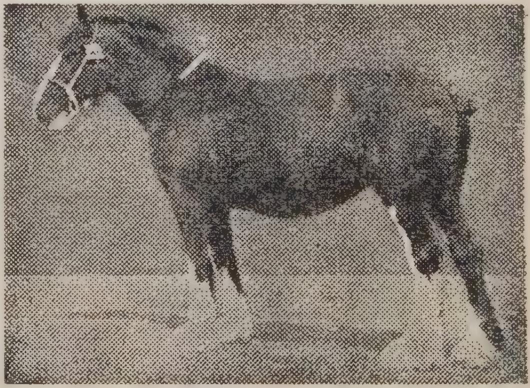

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CULTURE OF DAHLIAS . . .

For convenience dahlias have been classified into many groups, distinguished mainly by the shape, size, and character of the flowers, and nurserymen offer hundreds of good varieties for sale. The following varieties are outstanding, but there are no doubt many others equally good:—

GIANT DECORATIVE (giant flowers)

Clara Carder: Cyclamen pink, a popular prize-winning variety.

Daily Mail: An old, well-tried, deep yellow variety.

MINIATURE DECORATIVE (smaller flowers)

Willie den Ouden: Scarlet on a yellow ground.

Royalty: Violet mauve.

Baby Royal: A lovely variety, pink on a yellow ground.

CACTUS (large flowers with rolled petals)

Heart of Gold: Orange petals tipped with gold.

Moyra: Pink.

Victoria: Yellow.

Mascotte: Rose.

MINIATURE CACTUS (smaller flowers)

Andrie's Orange: Long stems, good cut flower.

Casula Glory: Apricot.

MINIATURE PEONIES

Bishop of Llandoff: An outstanding variety for garden display with deep rich red flowers and bronze foliage.

Sarah Peach: Light pink.

POMPONES (round formal flowers)

Doria: Deep maroon.

Mrs. J. Telfer: Pure white.

MIGNON (bedding)

These are very free-flowering dwarf dahlias much used overseas for bedding. Coltness Gem is the outstanding variety, with flowers of brilliant scarlet. Mignon dahlias seem to have gone out of fashion lately in New Zealand.

Common Dahlia Troubles

The list of diseases and pests recorded on dahlias in New Zealand is formidable, but fortunately the troubles are not usually serious. Dahlias usually grow and flower well with little trouble if given suitable soil and proper treatment. Virus disease is the most serious of those in the list which follows, and gardeners should always be on the lookout for this trouble and prompt to remove and burn affected plants.

Aphids of various sorts can attack the dahlia, disfiguring the blooms and young shoots. One of the commonest types of aphid found on the dahlia is the black bean aphis common on broad beans. All aphids can be controlled by regular applications of nicotine solution (made by dissolving a little soap powder in warm water and adding it, together with 1 fluid ounce of nicotine sulphate, to 4 gallons of water). Nicotine sulphate spray is most effective if applied during the hottest part of the day. **It is important that it be applied as soon as the pest appears on the plants, as aphids breed very rapidly and if not noticed for a few days can cause major damage.** They usually congregate round the growing point of the shoot, where they puncture the young leaves and stem to extract the sap. Even if the aphids are killed the young leaves which were attacked still develop in a curled, distorted way and make the plant look unsightly.

The cineraria leaf-miner causes conspicuous tunnels in the leaves of dahlias, chrysanthemums, and many other plants. In severe attacks leaves may be killed, but the pest usually only disfigures the foliage. The easiest way of controlling leaf-miners is to crush them within the leaves with the fingers, a larvae usually being located at the widest end of each tunnel. A sharp watch should be kept for this pest early in the season, as there are several generations a year and it increases rapidly if unchecked.

Three fungous diseases of dahlias have been recorded, but none is usually of serious importance in the garden. Black spot, causing rounded spots up to ¼in. in diameter on the leaves, can be controlled, if necessary, by picking off and burning seriously-affected leaves and spraying the plants every two weeks with lime sulphur at a strength of 1 part in 100 of water. Wilt disease is more serious, as it can lead to the collapse and death of the whole plant, following the appearance of a discoloured area on the main stem. Affected plants should be dug out and burned, and spraying the plants which remain with 1 per cent. lime sulphur may help to check the spread of the disease.

Mealy bugs, which are common pests on citrus, pip, and stone fruits, also attack dahlia tubers, usually while they are in the glasshouse for propagating. The young plants should not be affected if there are no mealy bugs on the cuttings when they are removed from the parent tubers. A serious infestation of stored dahlia tubers can be controlled by dipping them in nicotine solution made up as described in the section on aphids.

The silver-Y moth is a common pest of dahlias, geraniums, and other garden plants. The caterpillars, which are pale green with dark lines down their sides, move by "looping" and feed on the leaves, out of which they eat large holes, leaving them ragged and unsightly. The caterpillars can be controlled by dusting the plants with derris dust or spraying them with arsenate of lead (2oz. of arsenate of lead powder mixed with 4 gallons of water).

Slugs and snails are fond of young dahlia shoots. They are most easily controlled by using a bait of bran and metaldehyde, a chemical which is extremely toxic to these pests. Proprietary preparations containing metaldehyde can be obtained; scatter the bait very thinly, without leaving any lumps, at the rate of 1oz. for each 10 square yards.

Thrips are nearly always to be found on dahlias, especially in the flowers. The insects are active and very small, with cigar-shaped bodies, creamy-yellow when young and black when fully grown. The adults have delicate, fringed wings and fly freely. Thrips feed on sap, which they obtain by scraping the surface of the plants, leaving a characteristic silvery or brown scurf on the leaves or flowers. Badly-affected plants may develop deformed buds and foliage or blotched, misshapen blooms. Where necessary the pest can be controlled readily by regular spraying with nicotine spray as recommended for aphids.

Virus diseases of at least two, and probably three, kinds affect the dahlia, but the most important is the spotted wilt virus, which also attacks the tomato and many other crop plants. Young dahlias may be severely affected, either with a yellow mottling of the foliage or, more usually, with concentric rings and wavy lines on the leaves, coupled with some distortion or stunting of the plant, which may become quite abnormal and dwarfed. Young plants may be severely affected, but older ones often seem to "grow out" of the disease to some extent, as the symptoms show less, though the plant is, of course, still affected. **Dahlias affected by spotted wilt are frequently the source from which tomatoes are infected with this disease, which is an extremely serious one to commercial growers.** No cure is known for affected dahlias, which should always be dug out and burned at once to prevent further spread of the virus. The disease is considered so important overseas that a collection of virus-free dahlias is being made with a view to their preservation and propagation in some isolated place, possibly an island off the west coast of Scotland. This stock could then be used as a source from which healthy tubers for further propagation could be obtained by nurserymen.

White flies, minute insects covered with a snowy wax, can attack dahlias under glass or in sheltered places out of doors. Where the insects are present in large numbers they spoil the appearance of plants by secreting a sweet liquid (called honey-dew) on which a black mould soon grows, forming a disfiguring sooty layer on the foliage and stems. Regular fumigation of a glasshouse with hydrocyanic acid gas, or the less dangerous tetrachlorethane, will control white fly, but an even easier method of control is to use the white fly parasite which has been introduced. Dahlias growing out of doors are unlikely to be attacked to any serious extent.

[Photo News Ltd.

Tropical Treasures

THOSE of you who have ever kept goldfish in your garden pool or a glass bowl indoors would have been specially interested in the shimmering forms which flashed to and fro in the six tanks ranged along one wall of the large aquarium I visited recently. It was fascinating to observe the many types of modern fancy goldfish, products of 700 years of selective breeding, and to contrast a scintillating, single-tailed Comet with a Calico Fantail, double-tailed and spotted like a child's toy Dalmatian, or a stream-lined Shubunkin with a round-bodied Nymph—the more rotund her figure the greater her claims to beauty. Not every goldfish is all colour and glitter, I found, for the Chinese variety known as Black Moor looks as if it had been fashioned from jet and its eyes protrude to an unusual degree, giving it telescopic vision.

FEATHERY green fronds of elodea, trailing hornwort (rather like a miniature lycopodium) and sharp-pointed sagittaria formed a fairytale world under water for the myriads of tiny tropical fish which formed the majority of the exhibits. Just over two years ago their owner was the first to bring fish to New Zealand by aeroplane and reinforcements have since continued to arrive regularly by this means during the summer months. Here were Leopard Fish from South-east Africa, which, though only 1½in. in length, were as lithe in their movements as the jungle beast after whom they are named; striped Zebra Fish from Bengal; Sumatra Barbs banded in black and scarlet as if they were wearing football jerseys; Blue Gouramis, also from Sumatra, trailing long feelers which were really an adaptation of the pectoral fins; Firetails from Argentina, whose tails glowed with a red light as they darted through the water; Guppies, natives of Trinidad, Guiana, and Venezuela (the new-born ones, consisting of merely two eyes and a tail, were the smallest inhabitants I saw in the whole aquarium, being no bigger than specks); Mexican Black Mollies, whose velvety darkness made a perfect foil for the Jewel Gouramis from the Malay Peninsula, some of which were coral-coloured, others palely opalescent, and others translucent with ruby and sapphire stripes.

Each spectacular Siamese Fighting Fish had his separate quarters. Their ferocity toward their own kin is such that, if a fighter encounters another, a death struggle ensues. Yet, strangely enough, a single one will live quite peaceably with other species of fish. The energetic individual with the flowing crimson fins and pugnacious expression was named after Britain's last Premier. His companion, who appeared to be slumbering, later woke to sudden life and began lunging this way and that, and generally indulging in a series of limbering up exercises in preparation for future battles. The only salmon pink specimen took no interest in proceedings whatever and drooped against the glass like some exotic flower.

I was highly amused at the antics of a pair of Kissing Gouramis. Though the swain pursued his beloved with the most flattering attention, his dainty companion would have none of him, eluding his advances with practised coquetry and not even deigning to notice when he demonstrated his domestic accomplishments by polishing his plant-draped dwelling with a vacuum-cleanerlike action of his mouth. This little chore attended to, he renewed his former pursuit with undiminished ardour. I only hope such touching devotion was duly rewarded, or else I am afraid he was doomed, like Narcissus, to become enamoured of his own reflection.

Another absorbing drama was being enacted nearby, where a group of Rosy Barbs from India had forgathered with their Chinese relatives for a family reunion. Judging from the way their heads were huddled together, I should say that the refreshments were a secondary matter compared with the affairs under discussion which probably concerned the solitary member who nibbled a morsel of food in desultory fashion at a discreet distance from the rest of the party. After the conclave broke up, a florid matron came over to him and emphasised her obvious dis-

[Photo News Ltd.

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approval with sundry sharp prods, so that he retreated post-haste to the furthest corner of the tank to brood over his disgrace.

An appropriate atmosphere of serenity prevailed among the Angel Fish of the Amazon. Two watchful guardians hovered close to the host of young ones, whose ability to maintain a placid pose for minutes on end reminded me of a tableau in silver and sable. The Red Tetras hailed from Rio, but the black-lined ones belonged to Argentina, and the wide, black-skirted variety to Paraguay. The black coloration in the latter becomes less intense with advancing age. The White Cloud Mountain minnows take their poetic title from their place of origin in the vicinity of Canton, where the fishermen frequently have to break the ice on the mountain streams before they can commence fishing. (I hear that a local enthusiast has now succeeded in breeding White Clouds in his aquarium.) There were at least eight different types of Platies in varying shades of reds and golds on display, these having been derived over the last quarter of a century from the wild brown Platy, a specimen of which swam unconcernedly among his more brilliant-hued brethren.

The African Jewel Fish, so elegant in their trappings of turquoise, occupied a tank to themselves. Their fragile appearance is completely deceptive, as they have the most voracious appetites and devour any smaller fish with whom they come into contact, even tearing the fins off larger ones unwary enough to venture near them. Their somewhat drab-looking neighbours, the "Ports" (short for *Aequidens portalegrensis*), are much more law-abiding and possess the additional virtue of being model parents. They thoroughly scour the site selected for egg laying (usually a thin, flat stone) and, after the eggs are hatched, scoop a depression in the sand and then wash and transfer their babies by mouth to their new abode. They move them to a fresh hole every day, tending them with the utmost care until they are able to fend for themselves.

The offspring of the Paradise Fish are cared for mainly by the male parent, who builds a bubble nest, drives off his spouse because of her unpleasant cannibalistic tendencies, and looks after the precious eggs himself. Later, when the young ones are swimming about he, too, is liable to lunch off them, so he is relieved of parental responsibilities by the aquarian, who removes him to another tank and feeds his youthful charges on *infusorium* culture (obtained from scalded lettuce leaves left in a jar in the sun) till they are old enough to eat ordinary fish foods.

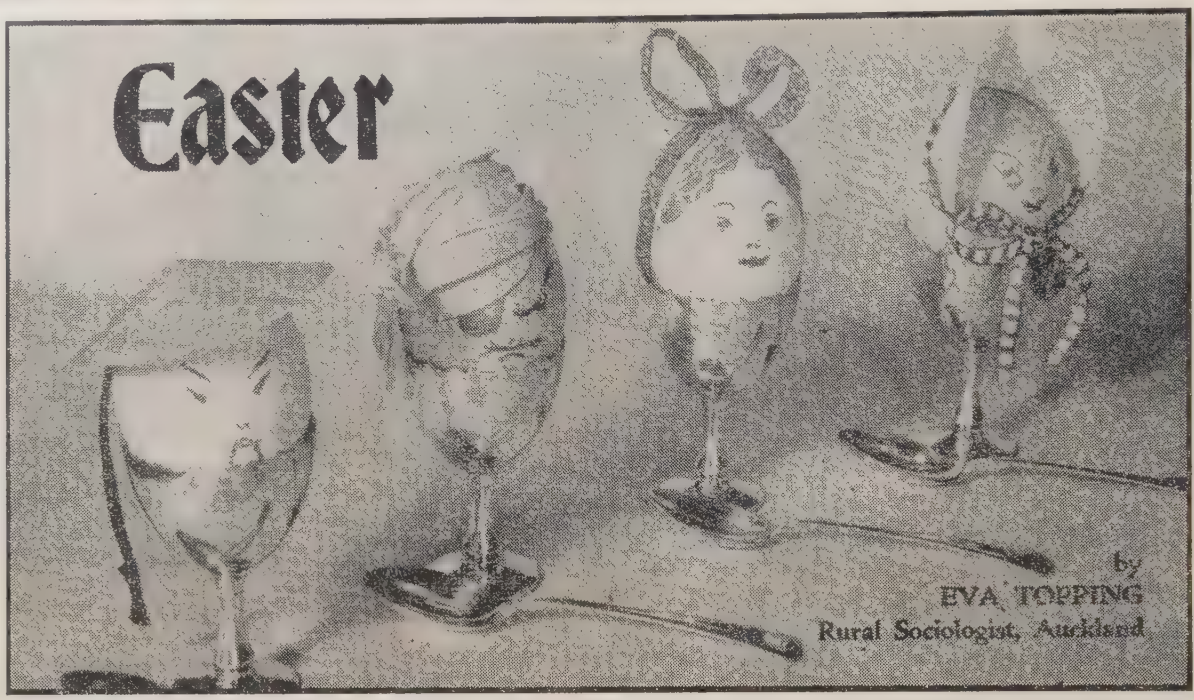
The contents of the three marine tanks were all collected from Wellington Harbour. (I was shown the massive copper helmet which the diver dons before descending to search along the sea floor; it weighs 60lb. and has observation windows of thick plate glass.) A fearsome-looking crayfish held court in the far tank after the manner of the Dragon King in the Eastern legend. His chief henchmen were a rosy-coloured chiton complete with armour-plated shell and a sea urchin whose needle-sharp spines moved unceasingly. The sea slugs looked somnolent. I discovered that a peculiar, greyish object rather like a bag tied up in the middle was a floating sea anemone.

The spider crabs sought to camouflage their whereabouts by planting clumps of seaweed on the tops of their shells, but the soft-bodied hermit crabs had to make do with the discarded shells of shellfish as their sole means of protection. In the end tank, however, the only creature at all versed in the art of concealment was a cockabully who happened to be the same shade as the stones. His red-speckled brother soon spied him and routed him out to play chasing among the spotties, leatherjackets, and miniature prawns, but he dodged behind a branch of coral at the first opportunity and resumed his contemplative role once more. The brittle stars presented a colour contrast similar to that of the cockabullies, one being a demure grey and the other a deep wine tone. Probably the most curious exhibit of all was a sea cucumber which lay limply against the rocks like a monster black caterpillar—when fully stretched out, it would be 9 or 10in. long. You would never have guessed that it was a relative of the neat little starfish and the sea urchin.

If you and your family have a fondness for pets, why not buy a suitable tank and try keeping an aquarium of your own? Learning how to look after it correctly is not difficult, as plenty of practical information is available on the subject. If you do not wish to bother with such equipment as a thermostat and electric lighting, there are quite a number of exotics (White Clouds and Leopard Fish, for example) which will thrive in an unheated aquarium in the normal warmth of your living-room. And whether you concentrate on marine specimens from your nearest coast, or the gleaming, "living jewels" of the Tropics, you will find the aquarian's hobby both educational and entertaining.

Mary

Easter



by
EVA TOPPING
Rural Sociologist, Auckland

THE beginning of Lent is marked by pancakes for Shrove Tuesday; hot cross buns come on Good Friday, and Simnel cakes and eggs are appropriate for Easter Sunday. The Easter tale relates that Simnel cake derives its name from a couple, Simon and Nell, who could not decide with what kind of cake they should celebrate their Easter rejoicing and the end of the Lenten fast. One favoured a plain cake richly iced, the other wanted a plum cake, and as they could not agree they decided to compromise. So Nell made a cake with some fruit and some icing which they christened Simnel cake. That is one story. There are others, but, whatever its origin, Simnel cake has become accepted as the special cake for Easter Sunday.

FOR centuries eggs have been the symbol of Easter, so for Easter Sunday breakfast serve decorated or tinted eggs. Harmless colouring matter may be added to the water in which the eggs are boiled — cochineal for pink, commercial vegetable colourings for green, blue, and yellow, and the thin outer skin of onions for various shades of yellow and orange. To make mottled colours lay bits of onion skin, geranium, violet or pansy petals, etc., on scraps of soft rag or muslin and tie up each egg separately, binding the rag on so that the colouring matter comes into close contact with the shell while the egg is being boiled.

TO make decorated eggs draw faces with a soft pencil or a fine water-colour paint-brush dipped in ink. If the eggs are to be hard boiled and not used immediately, it is better to use pencil, as ink may penetrate the shell and discolour the white.

Make paper hats, cottonwool beards and hair, ribbon bows, and other decorations beforehand, and when the eggs are cooked quickly adjust them with a dab of paste or raw egg white. Pirates, clowns, baby girls, negroes, and other characters can be depicted, and the addition of a hat or bow makes them look very attractive.

HOT CROSS BUNS

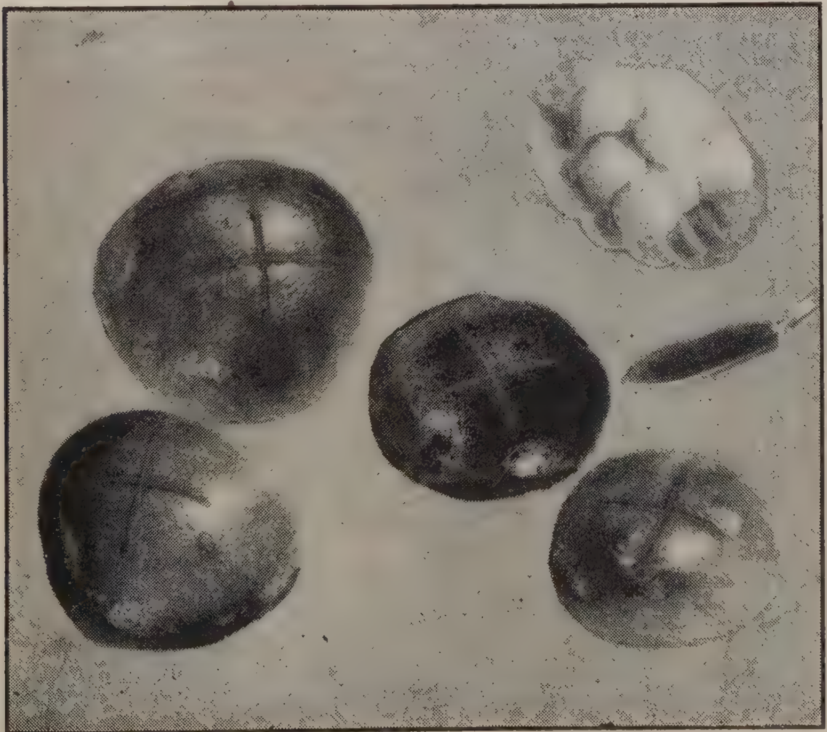
THIS traditional fare has practically disappeared from the bakers' shops during the past few years. They may be more plentiful this year, but make them at home and be sure. Bake the buns the day before and reheat them for Good Friday breakfast or tea. Any that are left over can be split, toasted, buttered, and served hot.

Quantities for 18 to 20 buns:

1oz. compressed yeast
1 teaspoon sugar
½ pint milk
1oz. butter
12oz. flour
2 dessertspoons sugar
1 tablespoon currants or sultanas
1 dessertspoon peel
large pinch salt
½ teaspoon ground mixed spice
For the glaze: ½ cup milk
1 dessertspoon sugar

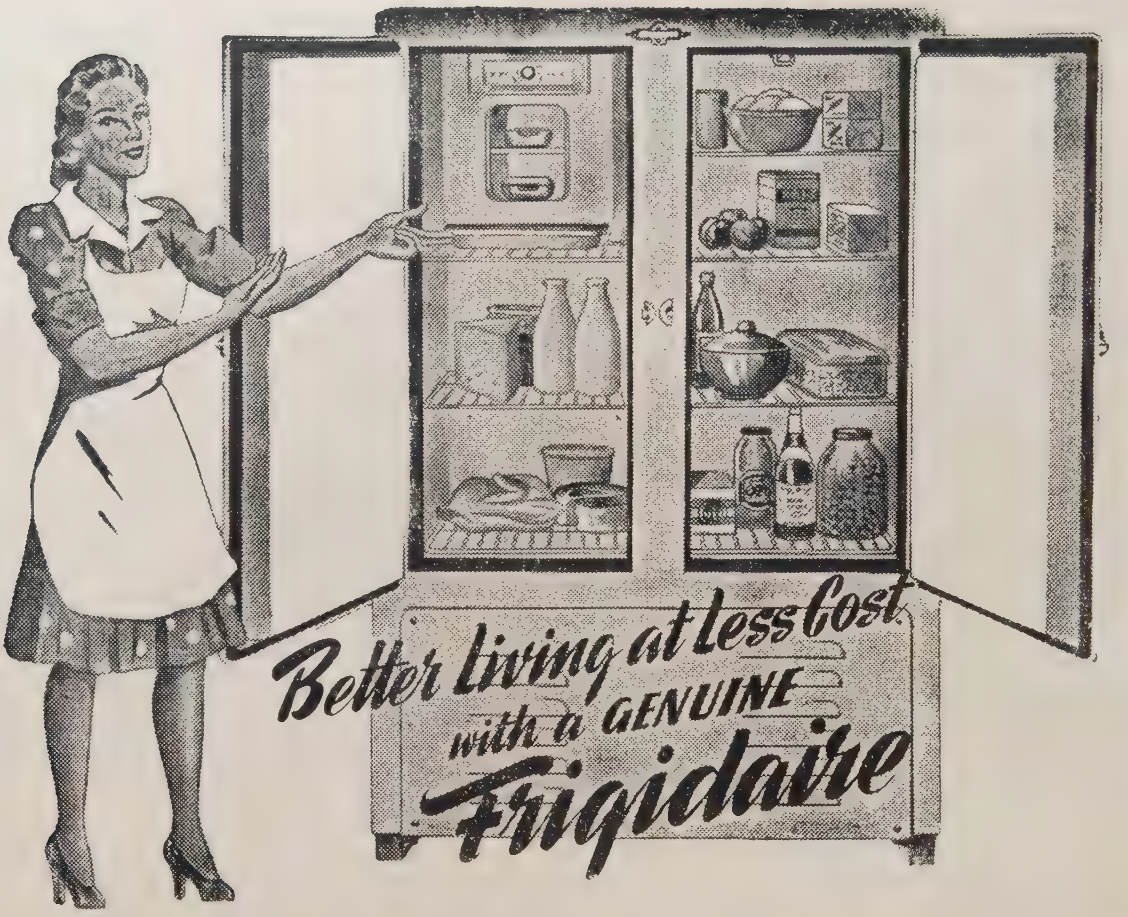
Sift the flour, salt, and spice together into a mixing bowl, add the sugar and fruit, and set the bowl on a rack or other warm place. Scald the milk, melt the butter in it, and cool it until it is tepid. Meanwhile, crumble the yeast into a small basin and stir with 1 teaspoon of sugar until it is smooth and liquid; then pour on the cooled milk.

Make a well in the warmed flour and gradually stir in the liquid with the hand. Beat it well for 4 to 5 minutes to a soft sticky dough, sprinkle lightly with flour, cover the basin with a clean cloth, and set it aside in a warm place until the mixture doubles in size. This rising will take from ¾ to 1 hour, depending on the temperature and the freshness of the yeast.



When the dough has risen beat it again, then turn it on to a floured board. Mould it into a strip with floured hands and divide it into 18 to 20 equal portions. Form each piece into a round bun and put them on greased baking sheets, leaving plenty of room between them for spreading. Dip a knife into flour and mark crosses on the buns with its back, making deep indentations. Set the baking sheets in a warm place and let the buns rise again for 20 minutes or half an hour. Bake them in a moderately hot oven (450 degrees) for 15 to 20 minutes.

While the buns are baking put half a cup of milk and 1 dessertspoon of sugar in a small pan on low heat to dissolve the sugar thoroughly. Brush this glaze lightly over the buns immediately they are taken from the oven.



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EASTER BISCUITS

4oz. butter
4 tablespoons sugar
1 egg
2 cups flour
2oz. currants or sultanas
1 teaspoon baking powder
grated nutmeg
milk to bind
pinch of salt

Cream the butter and sugar and gradually beat in the egg. Sift the flour, salt, baking powder, and a little grated nutmeg to taste. Add these to the creamed mixture with the fruit, mixing them to a stiff dough with milk

Turn the mixture on to a floured pastry board and roll it out to ⅛in. thick. Cut it into biscuits with a large round cutter and put them on greased baking sheets. Bake the biscuits in a moderate oven (400 degrees) for 15 to 20 minutes until they are evenly browned, and cool them on a cake rack.

SIMNEL CAKE

Mock Almond Icing:

5oz. icing sugar
5oz. soya bean flour
2oz. butter
1 large teaspoon almond essence
½ teaspoon vanilla essence
1 teaspoon lemon juice or
¼ teaspoon lemon essence
2½ tablespoons water

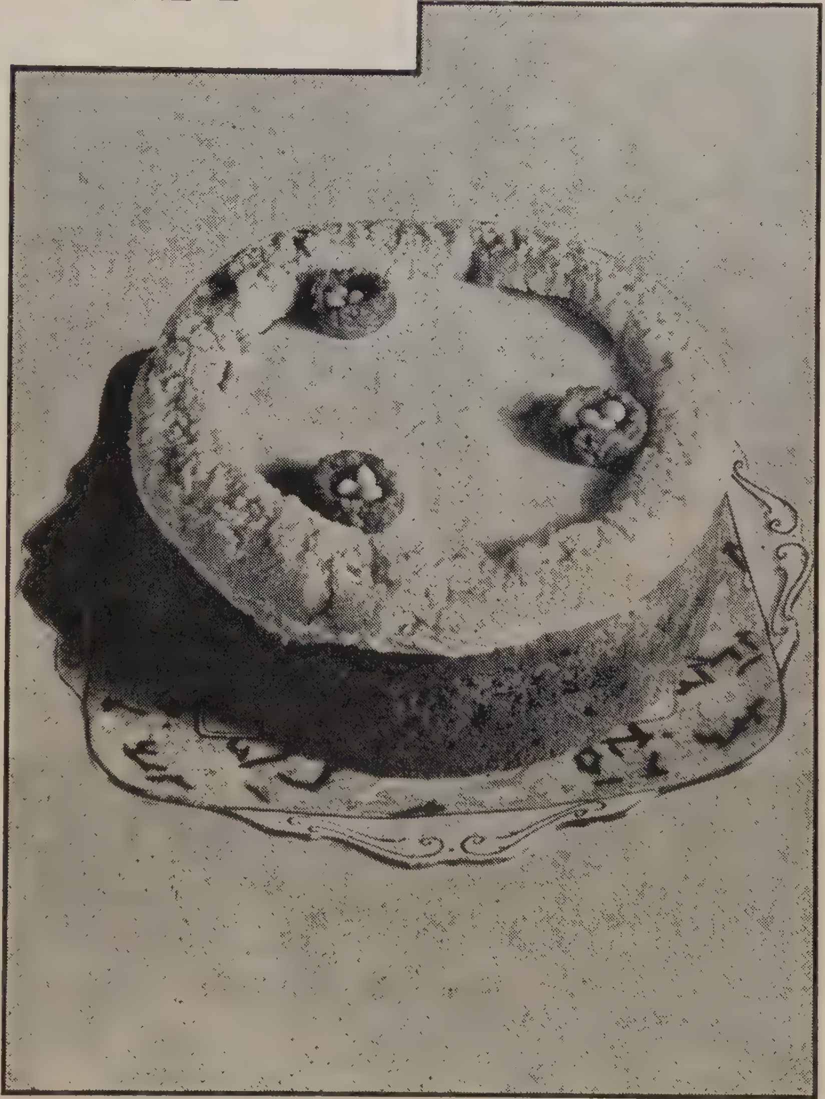
Melt the butter in the water with 4oz. of the sugar, cool it, and add the bean flour, lemon juice, and essences. Turn the mixture on to a board and, using the rest of the sugar, knead it until it is smooth. Take a generous portion and mould it into a flat round which will exactly fit a 7in. cake tin. Form the rest into a circle, reserving a little to make the birds' nests and egg decorations. Knead a little cocoa into a piece and form the nests, making tiny eggs of uncoloured icing.

The Cake Mixture:

8oz. flour
1 teaspoon baking powder
4oz. butter (or half butter, half lard or mild dripping)
4oz. sugar
3 eggs
8oz. fruit (raisins, currants, sultanas, or a mixture)
1oz. peel, or grated rind of orange or lemon
¼ teaspoon ground ginger
¼ teaspoon ground cinnamon
¼ teaspoon grated nutmeg
milk to mix

Cream the sugar and fat, beat in the eggs gradually, and add the sifted flour, baking powder, spices, and fruit alternately with the milk, mixing them to a stiff dropping consistency. Put half the mixture into a lined tin and smooth it flat. Lay the prepared round of almond icing on it and then put in the rest of the cake mixture. Bake the cake in a moderate oven (375 degrees) for about two hours until it's well risen and firm to the touch.

When it has cooled brush the edge with a little jam and set on the ring of almond icing. Roughen the surface of the icing with a fork. Make a little thin white icing and run it inside the ring, and when it is beginning to set place on the birds' nest decorations.



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parents eye view

Angel-child, sometimes . . . little monkey on occasions . . . but always deserving of the best . . . and the best in sleeping hygiene is, of course, Air Cell, the blankets that breathe. Air Cell blankets are twice as warm as ordinary blankets and weigh little more than half as much—just imagine that extra relaxing, refreshing sleep you get with Air Cell. They're showing now in an increasing range in the shops, in lovely pastel tones and with that gorgeous texture that makes them look as comforting as they really are.

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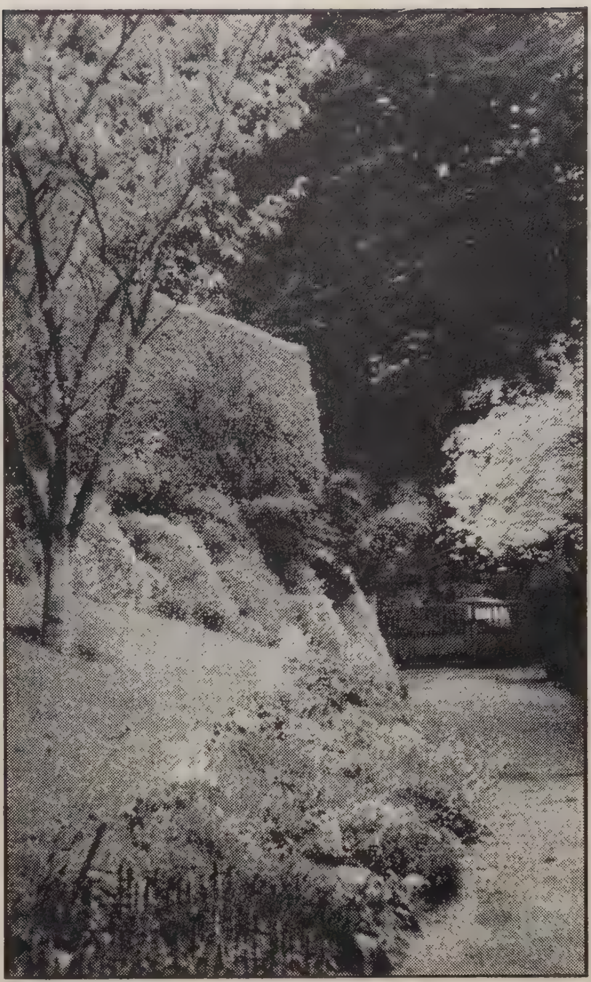
Flower Borders Need Plant Food

IN autumn it is usual to take stock of the flower garden and decide whether the season has been satisfactory. The manuring of borders is often overlooked, and a poor display during the summer may have been caused by neglect to provide flowering plants with the food they need. The manuring of flower borders is discussed in this article by J. P. Hudson, Horticulturist, Wellington.



EVERY pound of vegetables removed from the kitchen garden contains some plant food taken from the soil, and few gardeners expect to grow good crops of vegetables without returning plant foods to the soil in an annual dressing of animal manure or fertiliser, or both. Every bunch of flowers cut from the border, every dead flower head or seed pod picked off flowering plants, and every branch pruned off trees and shrubs has also removed some plant food from the soil.

Flowers Need Plant Foods

Yet it does not seem to occur to many gardeners that the flower borders deserve an annual feeding and will pay just as handsome a dividend for it as the vegetable garden.

The question is often asked: "How much manure should be given the flower border, and what sort of manure is required?" Unfortunately there is little reliable evidence on which to base a recommendation, and hardly any properly-recorded experimental data are available on the question. The plain fact is that little is known about the manuring of flower crops, though a confusing mass of information—much of it conflicting—is published in gardening books and articles.

The Main Plant Foods

It is known, however, that it is easy to over-manure flower beds, especially when applying nitrogenous fertilisers, as too much nitrogen tends to cause plants to produce an abundance of foliage at the expense of flowers. The use of quick-acting nitrogenous fertilisers, such as sulphate of ammonia and nitrate of soda, is especially likely to cause flowering plants to produce too much leafage. For that reason nitrogen in some organic, slow-acting form is usually to be preferred for flower production.

Phosphorus assists plants to develop an extensive root system, and is valuable in helping bedding plants to recover from the shock of being transplanted and in encouraging flowering plants to make a deep and extensive rooting system capable of collecting as much moisture as possible when the soil tends to dry out in the summer. As many soils in New Zealand are naturally deficient in phosphorus, it is safe, and indeed wise, to apply a dressing of phosphatic manure to the flower border at least once a year.

Potash is always regarded as important for flower production and the general health of the plant, but is present in adequate quantity in many soils in the Dominion. In the absence of more accurate knowledge of the potash requirements of individual flowers, the use of this manure on flower beds can be regarded as a general insurance rather than as likely to lead to any spectacular improvement in the border.

The minor elements, of which much is heard now in connection with farm and market garden crops, no doubt play an equally important part in the health of flowering plants. However, no experimental work has been done on the effect of the minor elements on flower production, and no recommendations can be made.

A Balanced Annual Dressing

So far as the rather sketchy knowledge available goes, the following mixture appears to provide the plant foods which flower crops require in the form and proportions in which they are likely to be most valuable:

Blood and bone: 3 parts by weight.
Superphosphate: 2 parts.
Muriate of potash: 1 part.

The mixture, used at the rate of 2oz. a square yard, should be applied to the whole area of the flower garden once a year, preferably when the ground is dug in early spring, or, in the case of shrubberies and herbaceous or mixed borders, as a topdressing when they are first cultivated after the winter.

Liming the Flower Border

Some plants, such as daphne, rhododendrons, and most heathers, are said to "hate" lime, as their leaves will go yellow and the plants may even die if planted in a soil which contains free lime. It would obviously be unwise to apply lime to a border which contained these plants unless it was very acid in the first place. On the other hand, many flowering plants do best if the soil is about neutral, while a few thrive in soil which is strongly alkaline. The whole subject of liming the flower borders will be dealt with in detail in a future issue. Meanwhile

[*Photo News Ltd.*

The hybrid mauve and yellow viola Jackanapes flowers freely from spring to autumn if it is cut back to remove the developing seed pods every time it shows signs of going out of flower. It can be used with good effect as an edging plant round borders.

it is strongly recommended that lime should be used only sparingly, if at all, on the flower border.

Humus is Essential

Plants can be expected to grow properly only if they can draw on a supply of the foods described. In addition, however, the physical condition of the soil is most important. A soil lacking in humus tends to be sticky in wet weather, cakes badly after rain, cracks in a drought, and soon dries out in dry weather. These defects can be made good to a large extent by adding humus to the soil, and it should be a routine measure to apply a dressing of compost, well-rotted animal manure, leaf mould, or other form of humus every year.

This organic material may be worked into the soil whenever it is dry, but on beds where semi-permanent herbaceous plants or shrubs make digging impossible it is best applied as a topdressing. For topdressing the material should be broken up, passed through a coarse riddle, and then spread evenly over the surface between the plants in a layer up to ½in. thick in late spring or early summer after the soil has warmed up.

GARDEN WORK FOR AUTUMN

Beds of hardy annuals, bedding plants, and other seasonal subjects now past their best should be cleared, dug over, manured if necessary, and trodden firm again ready for replanting with spring flowers. Good displays of flowers cannot be expected year after year unless the soil is kept fertile by replacing the food which is used up in producing the flowers, and also by adding some form of humus to keep the soil in a satisfactory physical condition.

Dahlias may be left in the ground all through the winter in favoured, frost-free districts and treated as ordinary herbaceous perennials. Elsewhere, or if the stock is to be increased, the roots should be lifted as soon as the leaves and flowers shrivel, taking care not to injure the tubers. Cut the old flower stems down to 6in., tie a label to the stems of named varieties, and put the roots in an airy place to dry off. When they are dry store them in a cool but frost-free place.

Evergreen hedges should be trimmed at once for the last time this season, if that has not already been done. The clippings of all hedges, including coniferous species, are too valuable to burn and should all be put on the compost heap. If there is a high proportion of dry, twiggy material, it should be sprinkled lightly with sulphate of ammonia and covered with a layer of softer refuse, such as lawn mowings, to ensure that it rots down.

Gladioli should be lifted as the leaves turn yellow and before the plants have died down completely to ensure that the bulblets are still firmly attached to the main corm. Spread the plants out to dry in an airy place until the stem is brown and the leaves crisp, then cut off the stems 1in. above the corms and put the corms away in well - ventilated, properly - labelled boxes until the time for examining and cleaning them (which will be dealt with later).

Hellebores of various species are of little value as ornamental plants, but are useful for cutting, as their unusual flowers grow during the winter. Plants should be put in a shaded place, where they will flower for years after becoming established, but should not be moved unless it is essential, as they resent being disturbed and often take some years to recover. Heavy rain is apt to splash the petals with soil, especially in the case of the species with short flower stalks, which are worth covering with a glass light or cloche at this time of the year, both to ensure clean, unspotted flowers and to encourage longer stems.

Herbaceous plants have now finished or nearly finished flowering. As they go out of bloom and the foliage turns yellow, sever the ties, remove the stakes, and cut each stem down to about 6in. above the ground. The old stalks are all worth putting on the compost heap to rot. If it is proposed to remake the herbaceous border this winter, or to divide some of the plants, care should be taken to label the plants when the flower stems are cut down, as some of them may be hard to recognise later when only the cut stumps remain. At the same time coloured tags should be tied on to the stumps to indicate which clumps are to be thrown out and which are to be increased and replanted.

Lily of the valley beds which have become overcrowded are best replanted at this time of the year, when the leaves have turned yellow. The old plants should be lifted carefully and the bed thoroughly and deeply dug, at the same time working a liberal dressing of old animal manure or compost into the lower levels of the soil. Before replanting the bed tread it thoroughly, as lilies of the valley thrive best in a firm soil. From the plants dug out select the best crowns for replanting. Each consists of a large bud to which should be attached a bunch of long, strong roots. Plant the crowns 3 to 4in. apart, using a trowel to make holes deep enough to

[Photo News Ltd.

The new shoots of Christmas lilies *(Lilium candidum)* appear a month or six weeks after the flower stalk dies down. If the plants have shown any signs of being attacked by *Botrytis* disease, the flower stalks should be cut off below ground and the rosette of new leaves pulled out and burned to avoid risk of infection next year from diseased leaves which have overwintered.

take the roots without doubling them up and with the crowns just below the surface of the soil, which should be refirmed after planting. Lilies of the valley can be expected to succeed only in a fairly deep, moist soil in shady positions. A few spare crowns can be potted and grown in the house to provide fragrance in the early spring.

Planting of the following should be completed as soon as possible before the cold weather makes their establishment more difficult: Hollyhocks, Canterbury bells, wallflowers, pansies, violas, polyanthus, Iceland poppies, stocks, ranunculuses, and anemones.

Shrubs which can be propagated from cuttings of new growth, 8 to 10in. long, taken at this time of the year, include *Lonicera nitida*, privet, laurel, *Escallonia* spp., and many others. The leaves should be removed from the bottom half of a cutting, which should then be cut off just below the place where the lowest leaf was attached and inserted firmly into the soil sloping at an angle of 45 degrees away from the prevailing wind. It is essential to make the cuttings firm, as the slightest rocking by the wind will prevent any roots from forming. Rooting hormones have proved effective in accelerating root formation on many of this class of cuttings, though it is only fair to say that most of them will root in any case if correctly trimmed and inserted.

Sweet peas to flower next year can still be sown out of doors in all but the coldest districts. Plants from this autumn sowing are hardy enough to stand the winter cold, and will produce much earlier flowers next season than those sown in the spring.

Walnuts will now be ripening. Grass growing around trees should be cut short and raked off and the ground generally tidied up to make collecting the nuts easier. When nuts start to fall the branches should be shaken vigorously with a long pole to make as many fall as possible. They should be picked up, husked if necessary, and dried by spreading them in a thin layer on a shed floor. **Nuts should not be left lying on the ground longer than necessary, as dew and rain can cause the shells to discolour.** The over-vigorous beating of trees at harvest time, causing much damage to young shoots, has nothing to recommend it and leads only to increased disease. The old saying, "A woman, a dog, and a walnut tree, the more they are beat, the better they be," is misleading—at least as far as the walnut tree is concerned!

Reminders About Garden Troubles

Lily diseases. The two common diseases of lilies cause much avoidable loss of lily plants every year in New Zealand gardens.

Virus diseases: Many types of garden lily are attacked by virus diseases, of which there are several, including one which is closely allied to the "breaking" virus of tulips and which occurs on *Lilium tigrinum* and *L. longiflorum*. Affected lilies can be recognised by the abnormal appearance of the leaves, which are flecked or streaked with yellow; stunted plants and misshapen, twisted flowers which fail to open properly are also signs that the plant is infected with virus. So far as is known, the diseases are spread mainly by insects and especially greenflies.

Plants attacked by virus cannot recover but should be dug out and burned as soon as the symptoms are seen. To leave infected plants in the bed is only asking for trouble, as they are likely to serve as a centre from which infection can spread to healthy lilies. It is also worth while, especially in valuable collections, to apply a nicotine spray to all the lilies every 10–14 days throughout the season to keep down the aphis population. Occasional aphides, coming in from elsewhere, may still bring fresh infection, but routine spraying does much to prevent its wholesale spread.

The lily virus diseases are not transmitted through their seeds. One way, therefore, of obtaining healthy plants of species (but not of hybrids) is to grow them from seed. Virus diseases are transmitted to the new plants if lilies are propagated by bulb scales or bulbils.

Botrytis disease is caused by a fungus (*Botrytis* sp.) and results in brown spots on the leaves, which later die and shrivel up. In severe attacks the flowers and even main stem are also killed by the fungus, leading to the death of the whole plant. The disease, which is spread from plant to plant mainly by the wind, is always most severe in wet seasons. The fungus may live from one year to the next in dead leaves or stems, or even in the soil, but by far the most important source of infection is in diseased leaves of *Lilium candidum*, which retains a rosette of foliage through the winter and thus serves as a centre from which the disease can attack other species in the spring.

A reasonable measure of control of botrytis disease can be obtained by: 1. Cutting down to the ground and burning any plant seen to be attacked; 2. Pulling off and burning the basal rosette of leaves from *L. candidum* in midwinter (this does not harm the bulb); 3. Burning dead lily stems and foliage when they die down after flowering; 4. If the slightest signs of attack are seen, applying a copper fungicide spray at once to protect the remaining lily foliage. It is a bad practice to leave a few inches of the old flowering stem to mark the place of the bulbs. When the leaves go brown the stems should be cut to below ground level or pulled right out. A stick can then be inserted to mark the site.

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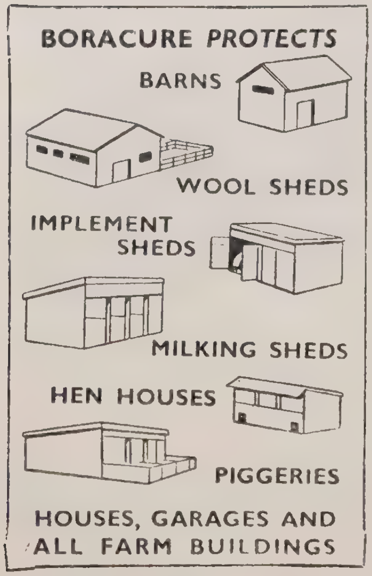

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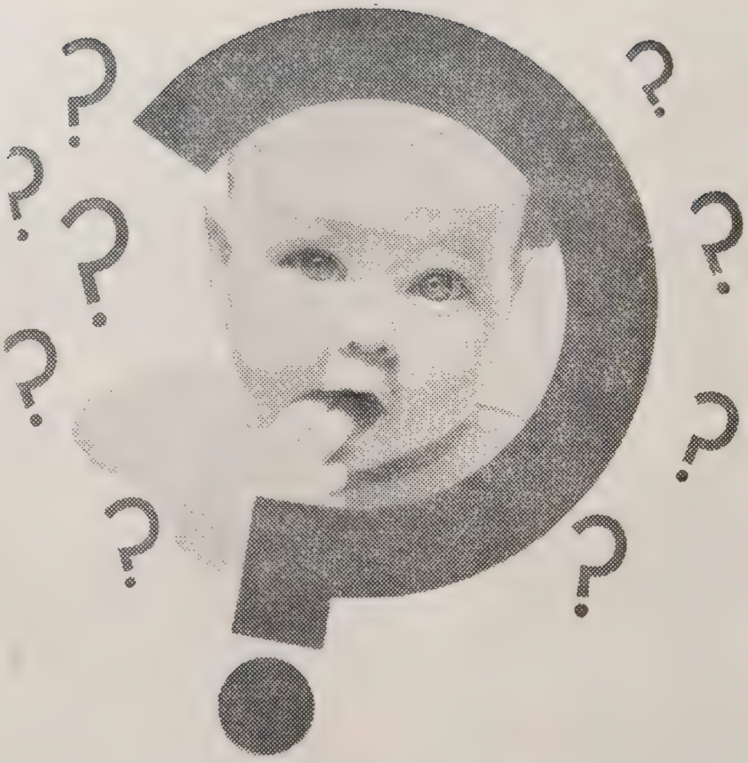

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A WORD TO FATHERS-TO-BE . . .

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LIGHTING and HEATING

by Norma K. Metson

TO be efficient, lighting and heating must be planned as an integral part of a house, and they will not be satisfactory unless the technical details of installation are carried out in accordance with recognised rules. If these are ignored, no decorative elegance will overcome the faults—annoyances such as a smoking chimney or only one light switch on stairs.

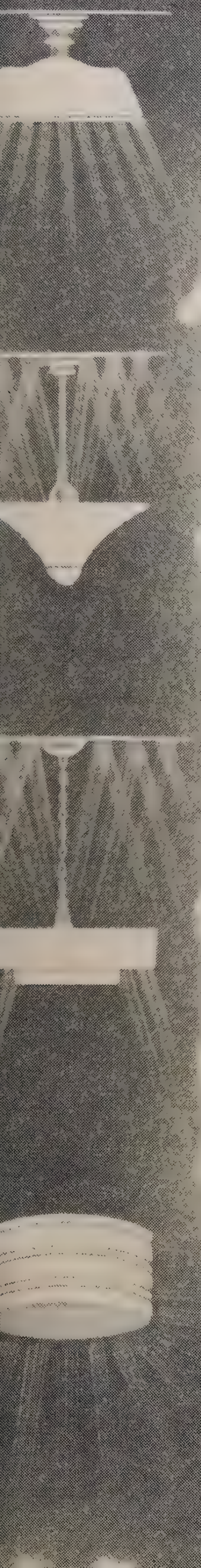
Good lighting, of course, begins with adequate daylight, and farm homes are fortunate in having no closely-packed neighbours to obscure their windows. Modern houses are characterised by large windows, but architects are sometimes heard to complain that they plan large windows only to find that people cover them almost completely with blinds and curtains, or place a dressing table with a huge mirror directly in front of them. Most light comes through the upper part of a window, so that a blind pulled halfway down will obscure more than half the available light.

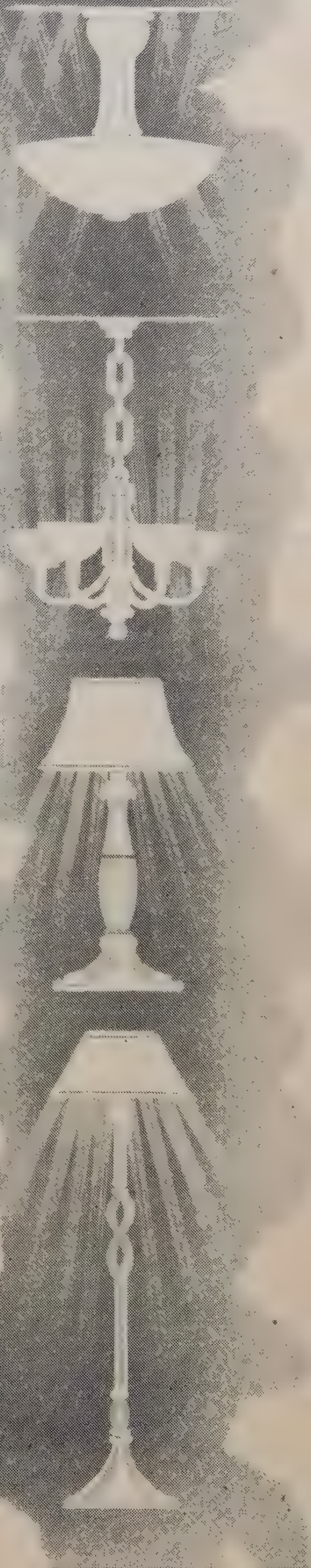
Artificial lighting cannot provide the ideal conditions of daylight for close work, but careful planning will eliminate much of the eyestrain and inefficiency caused by inadequate illumination. It will help to prevent accidents, too, because many dangerous falls around the home occur on poorly-lighted steps or when people are groping across a dark room to find the light switch. General lighting is provided by a central fixture in a room and by itself is sufficient for a hall or living room, but needs to be supplemented by reading lamps or small wall brackets in places where reading, sewing, or other close work is done.

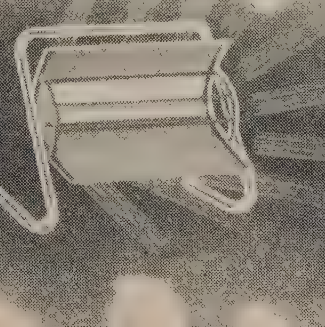
Lamp Fittings

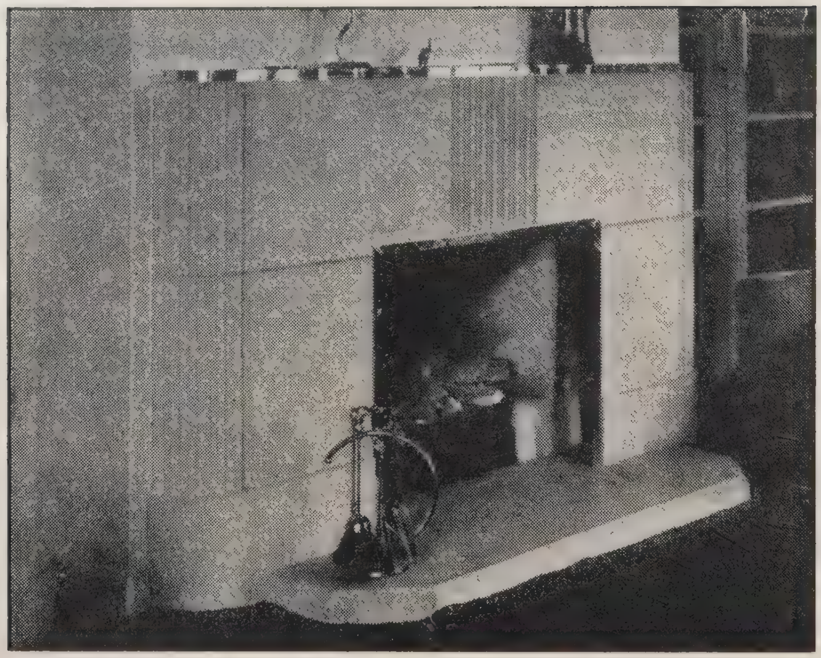
Lamp fittings determine the kind of light. Direct light falls downward in a beam, giving a bright light over a relatively small area and making sharp, definite shadows. Indirect light is obtained from fittings which throw the light rays upward and outward so that they are reflected from the walls and ceiling, which must be light in colour. The resulting illumination is soft and diffused with few shadows. Direct-indirect lighting provides a combination. The illustrations show the types of fittings which give these results. They are only types, and other designs can be used; for instance, cluster of small inverted bowls instead of one large one.

The general rule applies, however, that lighting fixtures should not be ornate in design, because the light itself is so conspicuous that it needs no additional emphasis. Any light bulb which is exposed within the range of normal vision—for example, in a bedside reading lamp—should be frosted or completely enclosed in a shade; the glare of a naked bulb is dangerous to the eyes.









[Sparrow Industrial Pictures Ltd.

Lighting the Kitchen

Adequate daylight is particularly important in the kitchen, not only because much of the work done there requires a good light, but also because nothing is more depressing to the housewife than a gloomy kitchen. The kitchen should have one large window, preferably over the sink, and an additional window or glazing on the top of an outside door is desirable if the room is large or oddly shaped. If window space is limited, as much as possible of walls and other surfaces should be light in colour.

Artificial lighting for kitchens should be arranged with special care so that the worker is not standing in her own light when at the sink or work table. The ideal arrangement is a good general light in the centre of the room and separate small ones over the sink, stove, and work centre. If that is impossible, the single light should be of higher wattage and placed above the sink rather than in the centre of the room. In a large kitchen, one end of which is used for meals, two general lights are desirable. Fluorescent lighting, because of its similarity to daylight, is particularly suitable for kitchens.

The small electric appliances used in the kitchen, such as jug and toaster, demand at least one, and preferably two or more, wall plugs at table-top height and handy to a working surface. An electric stove must have a separate installation.

Living Rooms and Bedrooms

The living room also needs both general lighting—to be used when the family is entertaining or listening to the radio—and local lighting, installed conveniently near the desk, piano, or bookcase. Wall plugs will be least noticeable if they are installed near the baseboard, but a higher one near the bookshelf or mantelpiece may be more convenient for the radio.

Bedrooms require good lighting for the dressing table and, if there is no bed lamp, a switch for another light which can be reached from the bed. At least one wall plug is necessary or an electric heater cannot be used in the room. Great care must be taken to see that bedroom lights are of the kind which eliminate glare; white, ivory, or opal glass covering shades are suitable. If the wardrobe is large or in a dark corner, a small light inside will be a great convenience.

In a bathroom the best light is required over the mirror, and as this room is usually small and painted a light colour one fixture is adequate.

In halls and passages general lighting is sufficient, controlled by one switch in a central position or, preferably, by two-way switches, one at each main entrance. Outdoor lights should have a switch just inside the door.

Fireplace Design

In the average New Zealand home heating centres round the open fireplace in the living room. The following specifications, taken from "Home and Building," Vol. IX, No. 1, March, 1946, page 41, are designed to ensure an efficient and smokeless fire:—

"The best proportions for an ordinary open fireplace with a colonial type grate are: Height, two-thirds to three-quarters of the width; depth from back, half to two-thirds of the height. The sides should run back straight for about 4in. and then be splayed a few inches inward. The back should run up straight about 1ft. and then be splayed or curved outward so that the fireplace is contracted to a throat the same length as the width of the fireplace opening and between 3 and 4½in. wide. This sloping forward of the fireplace back also provides a smoke-shelf immediately under the flue, which discourages down draughts. The level of this shelf and the throat should be 3 to 9in. above the top of the fireplace opening. The smoke chamber above should slant up at about 60 degrees from both sides and the flue should start vertically over the centre of the fireplace and extend with bends not flatter than 60 degrees to 2ft. above the nearest peak of the roof. Its area should not be less than one-tenth that of the fireplace opening and at least equal to the area of the throat."

The exterior design of the fireplace and mantel does not need to be elaborate—fire, like light, is attractive enough in itself. Bricks, tile, and concrete are favourite choices, depending on the general style of the room. Brick is sometimes thought of as "old-fashioned," but it can be used successfully in sophisticated modern rooms.

In a room where an electric heater is used permanently a surround can be built to take the place of the fireplace and mantel.

Other Heating Methods

Central heating is not really necessary or economical in most areas in New Zealand, and where it is used it tends to take the form of the heating stove rather than the full-scale, basement-installed system. A recent English development is a heat service unit consisting of a stove which heats the room in which it is situated, circulates warm air to the rest of the house, heats a drying cupboard, and provides hot water. This provides for maximum utilisation of fuel and a background of pleasant warmth for the house which can be supplemented by electric heaters or fires if necessary. The hot water supply can also be supplemented by electricity.

Adequate insulation of walls and ceilings is desirable, particularly in cold climates, and reduces considerably the amount of artificial heating required in the home.

In both heating and lighting the home, the best advice is to spend money on first-class installations which work well, and not on ornate exterior decorations.

SMOCKING

By EVA TOPPING, *Rural Sociologist, Auckland.*

SMOCKING is a dual-purpose form of stitchery: It not only decorates but also regulates fullness and holds it in position, controlling the width and fit of a garment. The hem may be very wide, but if smocking is worked at yoke or waist the garment will be graceful and well fitting. The traditional old English smocks were made entirely of rectangular or square pieces of material and were made to fit by smocking at necessary points—at the back, below the yoke, at the front on either side of the opening, at the top of the sleeves, and at the cuffs.

THE finished work often looks very intricate, but that effect is achieved by the combination and arrangement of a few simple stitches rather than by complicated stitches. Outline or stem stitch and its variations give an endless variety of patterns, and feather stitching is also used to add interest. Regularity of stitching and even spacing of the rows of work give smocking its special character and effectiveness of appearance.

Materials for Smocking

Almost any material can be smocked—all the lingerie materials and dress goods, silks, rayons, cottons, velvet, or fine woollens. The choice is controlled only by the type of garment being made. Of recent seasons even heavy-weight woollen goods have been smocked in honeycombing at the waistline for top coats.

Stranded embroidery cottons are the most suitable medium to use—3 strands in the needle for most work, 2 for fine materials, and 4 to 6 for very heavy fabric. Rayon thread and mercerised cotton are also useful, and white linen flax in skeins, familiar some years ago but difficult to obtain now, is another good thread.

Colours

The choice of colours is also practically unlimited. On self-coloured fabrics the smocking can be vari-coloured as in the illustration of a plain, round-necked frock, in matching colours as in the nightdress, or in contrast as on the white smock.

Beginners are usually advised to use matching colours, as irregularities are then not so noticeable in the finished work. When several colours are used on patterned materials they should match the colours in the material and preferably be of slightly deeper tones so that the stitchery stands out well.

Laying the Foundations

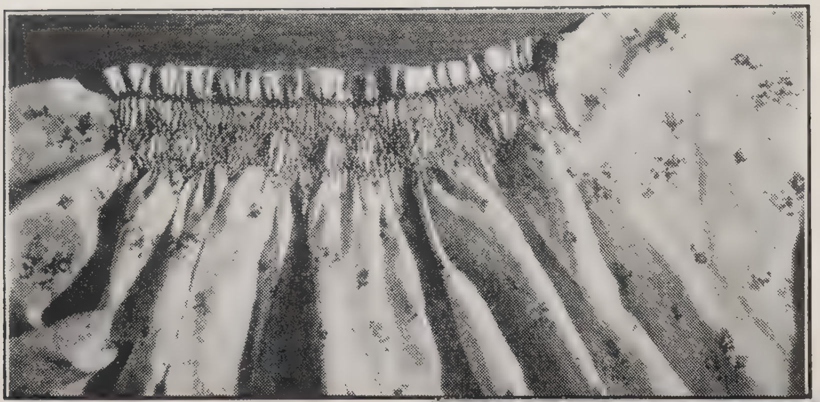
As in many other undertakings, good results depend on careful foundations. Attractive, regular smocking does not follow haphazard and careless preparation.

For most work allow 3 times the width the finished work is required to be: Thus, if the width of a yoke is 12in. allow a width of 36in. in the piece which is to be smocked to fit. In the finer materials more width can be allowed and in heavy materials rather less. If the measurement when finished and the amount for smocking do not fall readily into the 3-to-1 ratio, a short length can be left plain at each end of the smocked panel. For instance, if 36in. has to be set into 14in. at the yoke of a garment, 2in. can be left plain at either side; the amounts are then altered to 32in. to be set into 10in., and they are so near the 3-to-1 proportion that the extra will not matter. This point is plainly seen in the white smock illustrated, where there is an ungathered space on either side of the smocked panel.

All smocking should be done before a garment is made up. Cut the material out carefully, making sure that parts to be smocked are on the straight grain. Pick out the pieces for smocking and lay the other parts aside so that they will not become soiled or the edges frayed. Measure the piece to be smocked, find out what the finished width is to be, and make any adjustments or alterations needed.

Set the material **right side down** on the ironing board and with a warm iron stamp on the smocking dots, using a direct pressure and not a smoothing motion or the dots will be smudged. For most work transfers with ¼in. spacing are preferable; the closer ones can be used for very fine work and the wider ones for heavy fabrics. If the dots are put on the right side, they are likely to show when the guide stitches are withdrawn. Use sufficient transfer

SMOCKING PATTERNS

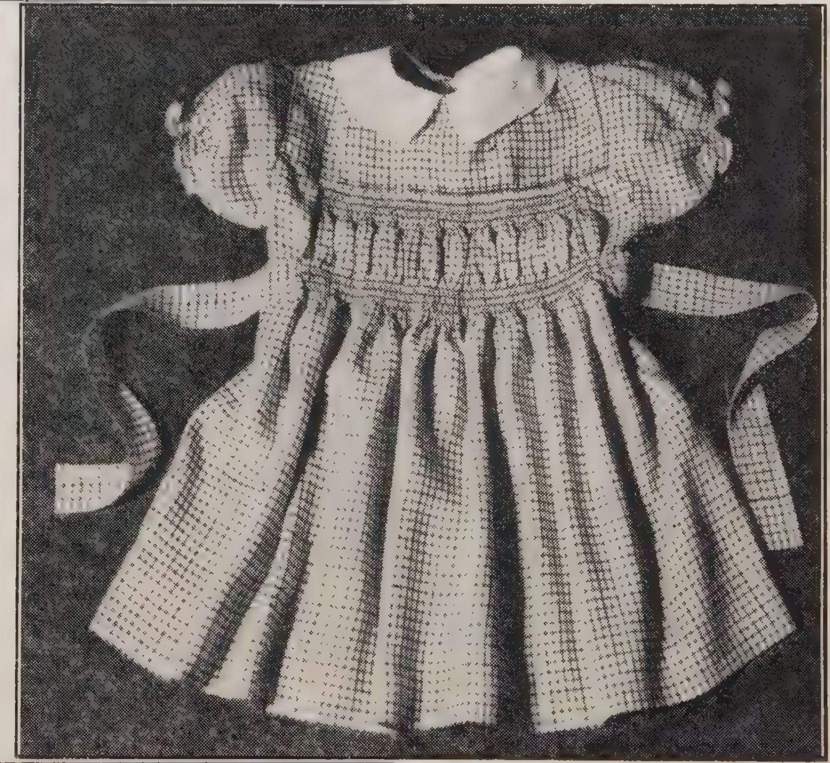


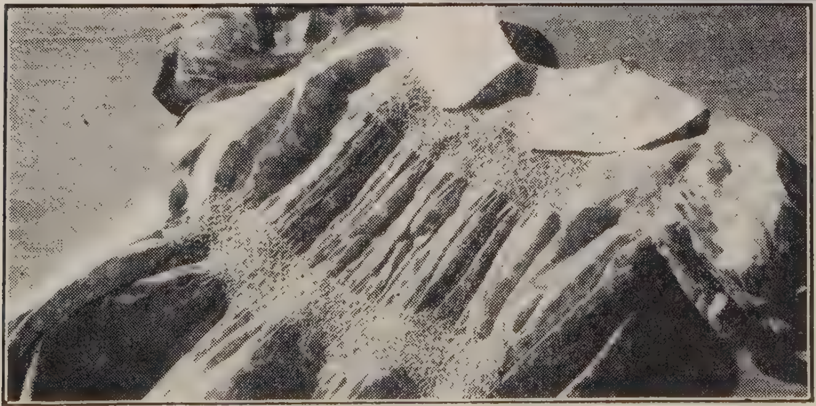
Small-checked Frock (below)

Transfers of smocking dots are not necessary when using small-checked materials, as the lines of foundation stitches can be evenly run by following the checks. The pattern is given in Fig. 12, using a single row of cable, a row of single wave, a row of cable, and points of Vandyke stitch, with 9 pleats to each point.

Simple Pattern for Beginner (above)

The illustration shows a simple pattern for a beginner. Stamp on a length of dot transfer 8 rows deep. Turn a hem to the top row of dots and run rows of gathering. Work cable stitch in a double row for the top; that will keep the work firm. Beginning at the left again on the second row of foundation stitches, bring the needle out at the first pleat. Catch the second pleat halfway between the foundation rows, the third on the foundation row, the fourth between, and the fifth on the fourth foundation row. All those stitches should be made with the thread above the needle. Take the sixth pleat on the fourth foundation row with the thread below the needle, and continue taking each adjacent pleat with the thread below to correspond with those already worked downward. Continue to the end of the row. Work a second line of waves, starting at the left on the third foundation row and working down to the fifth row and back up to the third. Start the third wave in reverse on the seventh foundation row, working up to the fifth. The fourth wave starts on the eighth foundation row and works up to the sixth. Fig. 10 shows the pattern in detail.





Patterned Frock (left)

This pattern is worked entirely in cable and double wave stitch arranged to form diamonds. The smocking is done in white stranded cotton, with three strands in the needle, and is very effective on the red and white pattern of the material. (Fig. 13.)

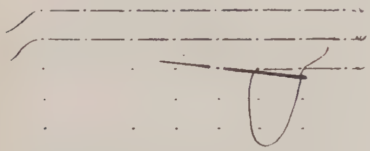


Fig. 1A.

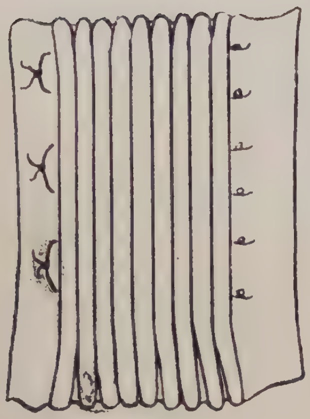


Fig. 1B.

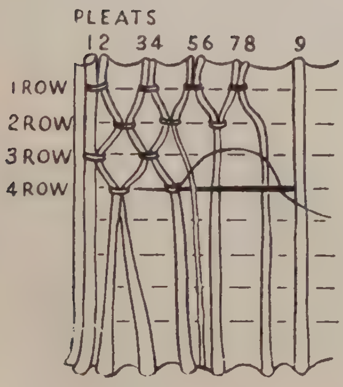


Fig. 2—Honeycomb. Fasten at the first pleat first row, catch the second pleat; needle behind and down to the second pleat second row; catch third and second pleats together; return the needle behind the third pleat to the first row third pleat, and catch it to the fourth. Continue to the end of the row, then start again on the third and fourth rows and continue to the depth required.

to mark the required width and depth of the smocking. Take care that the dots are set on the grain of the material and parallel to the cut edge.

Thread a needle with sewing cotton (36 or 40 for most work, 50 to 60 for very fine) long enough to complete one row of stitches, and tie a good-sized knot at the end so that it will not drag through when the material is gathered up. Begin at the right and take a small stitch under each dot, as shown in fig. 1A. Unthread the needle at the end of the row and leave the end loose. Pick up each row of dots in the same way, always using sufficient thread to complete the row and leaving all the ends loose.

Pull up the loose threads and the material will fall into little folds or pleats. Tie the loose ends in pairs so that the finished width is obtained. Make the ends very secure or they will slip out of position and tend to make the smocking uneven (fig. 1B). Some workers wind the pairs of threads round pins, but for a beginner the tying method is recommended as the pins may tangle the working thread or prick the fingers. Pull the material gently to make the gathers set evenly and it is ready for the smocking.

Stitches Described

These are the stitches which are used in smocking:—

Honeycomb Stitch: Working from left to right, set the needle through the first pleat from the back on the top row of dots. Take a stitch on top of the first pleat, then one on top of the second pleat; draw them together and take another stitch through second and first pleats, drawing them tight. Replace the needle in the second pleat, passing it down behind to the second row of dots and out at the second pleat. Catch the third pleat, then make a stitch from third to second, drawing the two together tightly. Replace the needle in the third pleat, bring it out in the third pleat of the first row, stitch the fourth and third pleats together, and repeat to the end of the row of dots. Start again at the left and work on the third and fourth row of dots, repeating until the required depth is completed. Fig. 2 shows the work in detail.

This is the most elastic type of smocking and is particularly suited to heavy material.

Outline Stitch: Knot the thread and bring it out at the first pleat on the left side. Pick up the top of the next

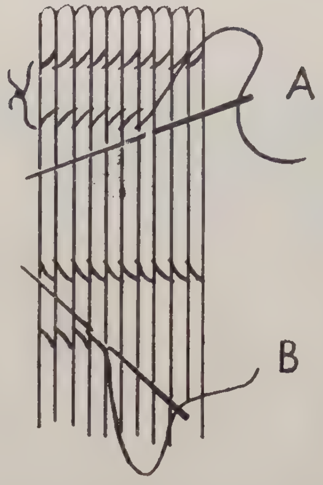


Fig. 3.—Outline Stitch. A: Begin at the first pleat and take one stitch through each pleat with the thread above the needle. B: Begin at the first pleat and take a stitch sloping upward with the thread below the needle.

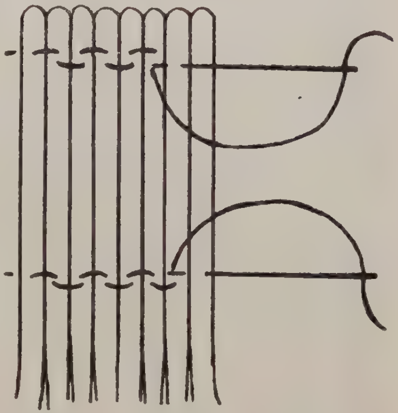


Fig. 4.—Single Cable Stitch. Take one stitch on each pleat with the thread alternately above and below the needle.

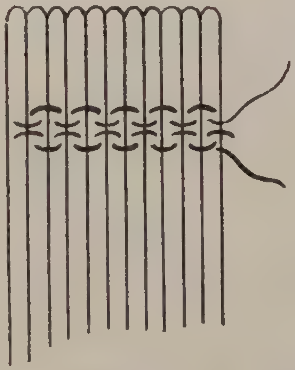
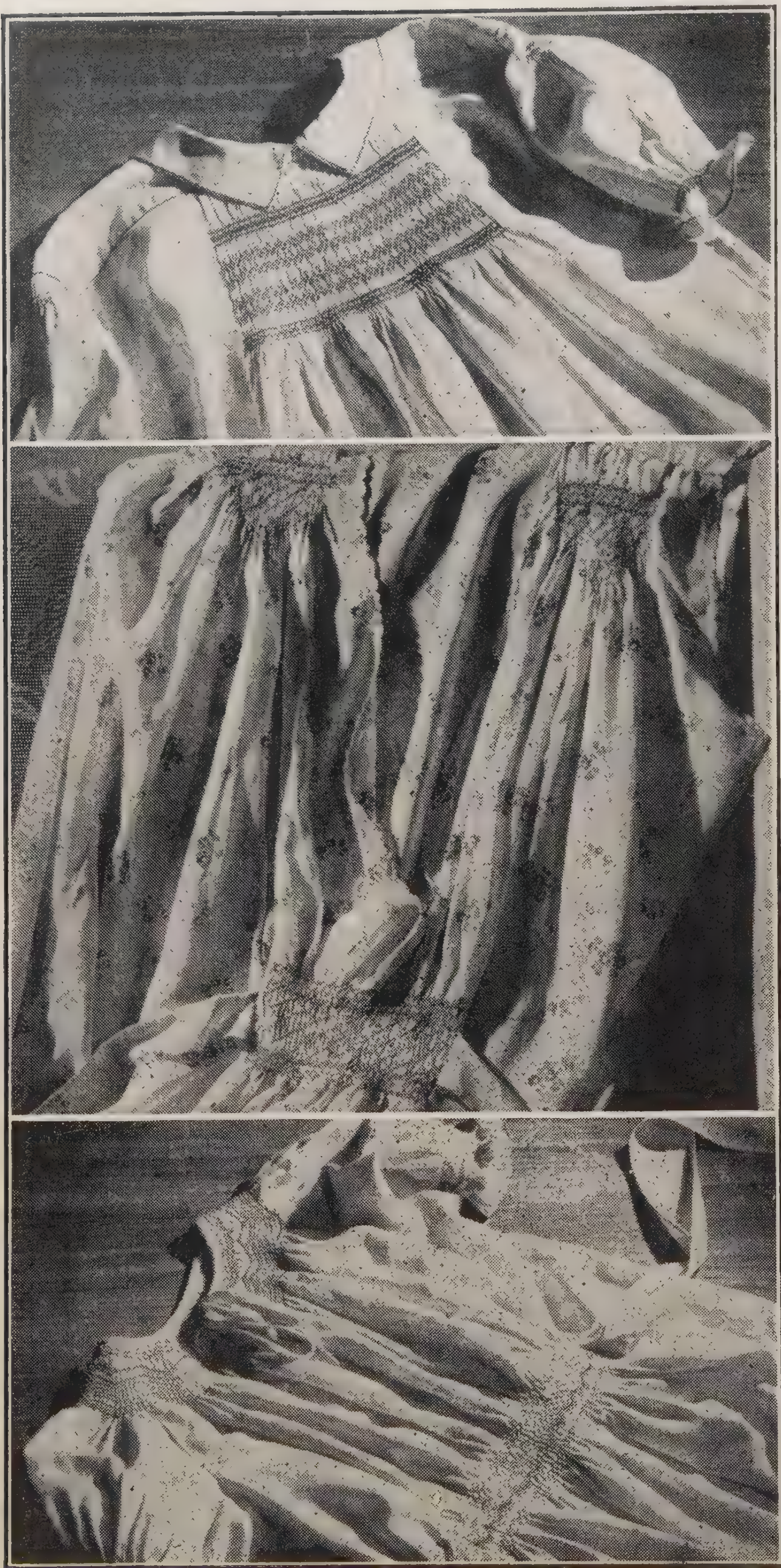


Fig. 5.—Double Cable Stitch. Work two rows of cable stitch on one foundation row with the "up" stitch above the "down" stitch on the lower row, and vice versa.

SMOCKING PATTERNS



White Smock

Worked in deep blue cotton on white material, this pattern is most effective. The top and bottom sets of stitching consist of one row of outline stitch, a double row of cable stitch, and a row of outline again. The two central patterns are as shown in Fig. 15. Even spacing and regularity of stitches are necessary in all the patterns, but this one loses its effect if the slightest irregularity occurs.

Nightdress

The shoulders are worked to a point so that the fullness is released gradually to give a more pleasing effect and fit to the bodice. The pattern consists of a double row of cable stitch, one of feather stitching, another double row of cable, then rows of double wave stitch arranged to give the diamond shapes, gradually diminishing in length to a point as shown in Fig. 14. The waistline smocking is the pattern worked in a panel and finished with the same cable-feather stitch-cable rows as at the top. Worked in a deeper-toned blue to match the background of the material, the finished garment is very attractive and dainty. The shell edging finishing the neckline, armholes, and hem was described in the article "Lingerie Finishes" in the April, 1946, issue of the "Journal of Agriculture."

Round-necked Frock

When working smocking for a round neck a pattern cut from firm paper is needed. Run all the foundation stitches and leave the ends free. Tack the paper pattern into position. Draw up the threads to fit and arrange the gathers evenly before starting the smocking. Three rows of single cable start the pattern to give a firm edge. Next come ten rows of wave stitch, taking seven pleats down and seven up for each point. The waist panel is three rows of single cable and five rows of wave stitch, using four pleats down; then repeat the three cable rows. The sleeves have the three cable rows at top and bottom of the pattern, with two rows of wave stitch between. The frock is of lemon yellow viyella with the smocking in shades of yellow to orange, brown, and pale green.

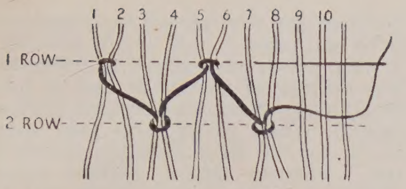


Fig. 6.—Single Wave Stitch. Bring the needle out in the first pleat at the first row with the thread above the needle; catch the second stitch, and draw them together. With the thread above, catch the third pleat at the second row; with the thread below the needle, catch the fourth pleat and draw them together. With the thread still below, catch the fifth pleat on the first row; with the thread above the needle, catch the sixth pleat and draw them together. Continue this to the end of the row. The pleats are shown wide apart in the illustration to make the method clear.

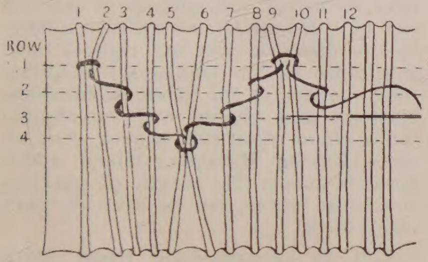


Fig. 7.—Double Wave Stitch. Work as for the single wave stitch (fig. 6), but make more stitches between top and bottom points. Keep the thread above the needle on the way down and below on the way up.

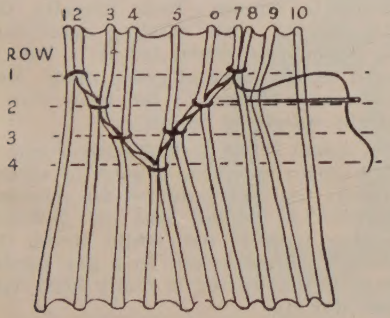


Fig. 8.—Vandyke Stitch. Similar to fig. 7. Catch the stitches thus: Pleats 1 to 2 on the first row; pleats 2 to 3 on the second row; pleats 3 to 4 on the third row; pleats 4 to 5 on the fourth row; pleats 5 to 6 on the third row; pleats 6 to 7 on the second row; pleats 7 to 8 on the first row. Keep the thread above the needle on the way down and below on the way up.

pleat, insert the needle slanting downward slightly and with the thread above the needle, or slanting upward slightly with the thread below the needle. Work whichever way is preferred but **keep to the one method** along the row or the work will be irregular. Keep each stitch exactly in line over the foundation thread and pull them firm but not too tight. (Figs. 3A and 3B.)

This stitch does not stretch and is most useful for the first and last rows of a pattern where the fullness has to be entirely controlled.

Cable Stitch is very similar to outline stitch but the needle is inserted horizontally with the thread alternately above and below the needle (fig. 4). Two rows worked together on one line of foundation thread, with the stitches opposite each other, give a chain link effect (fig. 5).

This stitch does not give much and is also useful for making the top and bottom of a smocked panel firm.

Vandyke, Wave, Chevron, Surface, Honeycomb: All these stitches are similar and are developments of outline and cable stitches.

Single Wave: Insert the needle through the first pleat and, with the thread above, pick up the second pleat and draw them together. With the thread still above the needle, pick up the third pleat in the row below; then with the thread below the needle pick up the fourth pleat and draw them together. Still with the thread below the needle, pick up the fifth pleat in the top row; with the thread above pick up the sixth pleat, and draw them together. Continue to the end of the row. (Fig. 6.)

Double Wave is a variation of the single wave, but has two or more stitches between the points. Start as for the single wave and, with the thread always above the needle going down and below the needle going up, work in points, taking one pleat with each stitch as shown in fig. 7.

Vandyke: Similar to both wave and double wave, this stitch is very effective. On each descent or ascent a stitch is made to draw the two pleats together. Fig. 8 illustrates the point of difference from double wave stitch.

Feather Stitching: In smocking the feather stitching is worked in the same way as on plain material, catching one pleat with each stitch and working evenly along a line of foundation stitches (fig. 9).

Many Combinations Possible

With the stitches described many combinations can be worked out to give varied patterns.

The pattern on the frock in the photograph at the head of this article

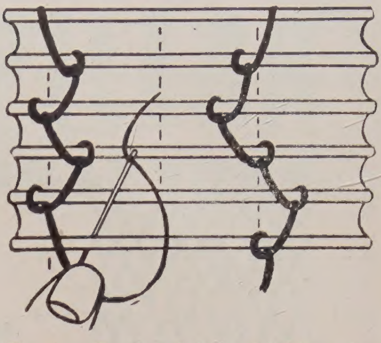


Fig. 9.—Feather Stitch. Holding the work sideways, take one stitch on each pleat.

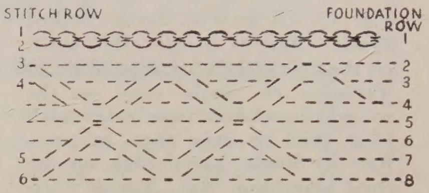


Fig. 10.—Pattern for Simple Smocking. Rows 1 and 2: A double row of cable stitch (fig. 5) worked on the first foundation row. Row 3: Four-step wave starting on the second foundation row. Row 4: Four-step wave starting on the third foundation row. Row 5: Four-step wave in reverse, starting on the seventh foundation row. Row 6: Four-step wave in reverse, starting on the eighth foundation row.

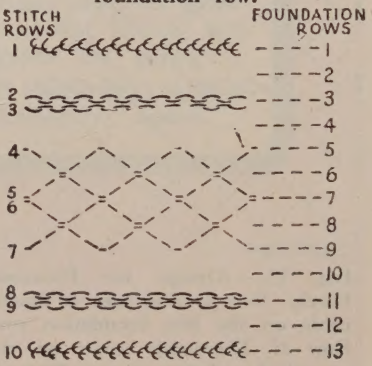


Fig. 11.—Pattern for Girl's Frock in Heading Photograph. Row 1: Single feather stitch on the first foundation row. Rows 2 and 3: Cable stitch on the third foundation row. Row 4: Two-step wave on the fourth to fifth foundation rows. Row 5: Two-step wave in reverse on the seventh to sixth foundation rows. Row 6: Two-step wave on the seventh to eighth foundation rows. Row 7: Two-step wave in reverse on the ninth to eighth foundation rows. Rows 8 and 9: Cable stitch on the eleventh foundation row. Row 10: Feather stitch on the thirteenth foundation row.

SMOCKING STITCHES . . .

uses feather stitching for the top and bottom rows with a double row of cable stitch on either side of the central pattern. Working details are given in fig. 11. The colours were chosen to match those of the pattern of the material.

Embroidery with Smocking

Smocking usually does not require further embellishment, though small rosebud and leaf sprays are sometimes used on babies' and small children's frocks. Such embroidery is worked in the centres of diamonds and is kept small and simple. French knot centres, bullion stitch petals, and lazy daisy work are the most suitable stitches to use. Feather stitch, outline stitch, French knots, and cross stitch may be used to trim the edges of cuffs and collars, but too much embroidery detracts from the effectiveness of the smocking.

Examples of embroidery for finishes are shown in the illustrations of a patterned frock, where cross stitches decorate the collar, and of a smock, where outline stitch is used to edge the collar, sleeves, and yoke.

[Photographs by Sparrow Industrial Pictures Ltd.

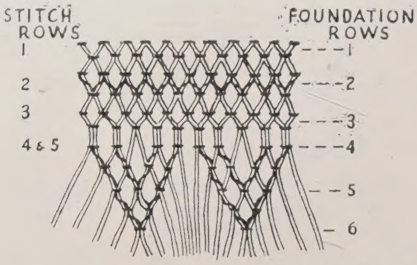


Fig. 12.—Pattern of Small-checked Frock. Row 1: Single cable stitch on the first foundation row. Row 2: Variation of single wave on the second foundation row; catch each pleat twice to draw them in pairs. Row 3: Single cable stitch on the third foundation row. Row 4: Four-step Vandyke. Row 5: Two-step Vandyke worked above the fourth step of the fourth row. Each pleat in rows 2, 4, and 5 is stitched twice.

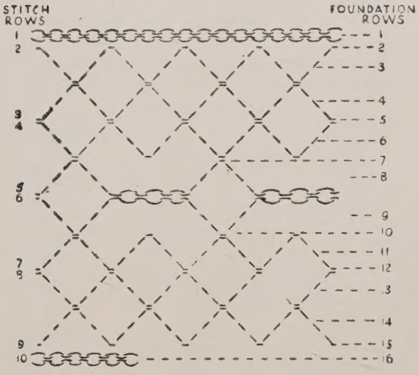


Fig. 13. — Design for Patterned Frock. Row 1: Two rows of double cable on the first foundation row. Row 2: Three-step wave on the second foundation row. Row 3: Three-step wave in reverse on the fifth foundation row. Row 4: Three-step wave on the fifth foundation row. Row 5: Three-step wave, three cable, three-step wave, seven cable, three-step wave; start between eighth and ninth foundation rows. Row 6: As for row 5 but in reverse. Row 7: As for row 2 starting on the twelfth foundation row. Row 8: As for row 3. Row 9: As for row 4 starting on the fifteenth foundation row: Row 10: As for row 1 starting on the sixteenth foundation row.

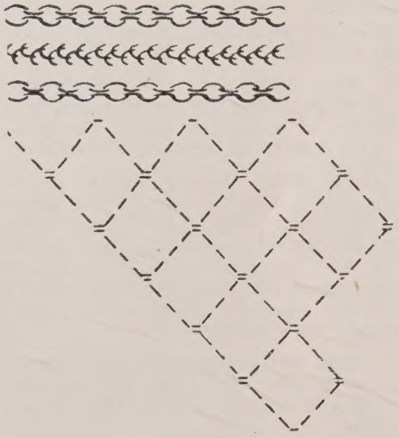


Fig. 14.—Part of Pattern for nightdress. Row 1: Two rows of cable stitch. Row 2: Feather stitch. Row 3: Two rows of cable stitch. Row 4 and succeeding rows: Two-step wave; begin the second row of wave stitch and each succeeding row at the point of the wave immediately above, and end each row in reverse.

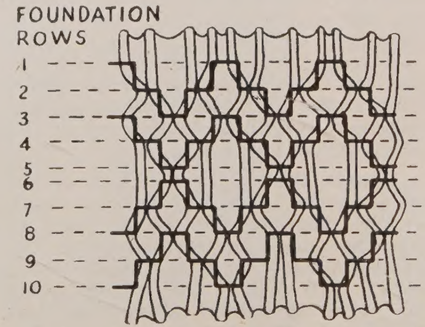


Fig. 15.—Part of Pattern for White Smock. Row 1: Outline stitch. Row 2: Double row of cable stitch. Row 3: Outline stitch. Row 4: Start at the right-hand side and catch the first and second pleats; take the thread up on the second pleat and catch it to the third; up the third and catch the third and fourth; down the fourth and catch it to the fifth; down the fifth and catch it to the sixth; down the sixth and catch it to the seventh; repeat. Row 5: As for row 4. Row 6: As for row 5 but in reverse. Row 7: As for row 4 but in reverse. Row 8: Outline stitch. Row 9: Double row of cable stitch. Row 10: Outline stitch.

From My Window

A LOVELY stretch of blue ocean that sparkles like silver when the morning sun shines; soft white clouds floating lazily by cast dark blue shadows on the water—ever changing, ever beautiful, this picture of sea and sky with Mayor Island outlined mistily in the distance. On my right I have a glimpse of Mt. Maunganui standing like a sentry at the gates of Tauranga Harbour and capped with enveloping white cloud when rain is near. And all along behind Matakana Island which sprawls across the length of our bay the little waves can be seen on very clear days.

And in between—the trees! Dark pines, old and twisted—you can imagine them heavily laden with snow as those pictured on Christmas cards; young pines slim and so straight; tall, restless bluegums; drooping willows already tipped with soft green; then, up the valley, a long sweep of native bush, lovely light and dark greens mingling together over the chattering mountain stream. How friendly the glimpses of road winding sometimes up, sometimes down till it is lost to sight in the curve of green fields. Red roofs half hidden in the trees give a bright splash of colour.

A sweet scent pervades my room. I look down to where a bank of violets shower their perfume on the morning breeze. A golden line of daffodils nearby nods at me, while across the lawn a riot of colour in a gay border heralds that spring is really here with her flowers.

An ever-changing picture: blue water, distant hills, rolling fields, trees, and a corner of my garden; familar, yet always new—on grey days or sunny days, on misty days or rainy days, I can look out and love the view I see from my window.—**"Tiggetty Boo," Kati Kati.**

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